SECTION 06 10 00
ROUGH CARPENTRY

PART 1 - GENERAL

1.1 DESCRIPTION:

Section specifies wood blocking, plywood and shims.

1.2 RELATED WORK:

A. Gypsum sheathing: Section 09 29 00, GYPSUM BOARD.

B. Metal flashings at wall coping assemblies: Section 07 60 00, FLASHING AND SHEET METAL.

C. Roof membrane at coping assemblies: Section 07 54 23, THERMOPLASTIC POLYOLEFIN (TPO) ROOFING.

D. Expansion joint cover assemblies: Section 07 95 13, EXPANSION JOINT COVER ASSEMBLIES.

1.3 SUMBITTALS: (NOT USED)

1.4 PRODUCT DELIVERY, STORAGE AND HANDLING:

A. Protect lumber and other products from dampness both during and after delivery at site.

B. Pile lumber in stacks in such manner as to provide air circulation around surfaces of each piece.

C. Stack plywood and other board products so as to prevent warping.

D. Locate stacks on well drained areas, supported at least 150 mm (6 inches) above grade and cover with well ventilated sheds having firmly constructed over hanging roof with sufficient end wall to protect lumber from driving rain.

1.5 APPLICABLE PUBLICATIONS:

A. Publications listed below form a part of this specification to extent referenced. Publications are referenced in the text by basic designation only.

B. American Forest and Paper Association (AFPA):
National Design Specification for Wood Construction
NDS-05.....Conventional Wood Frame Construction

C. American Institute of Timber Construction (AITC):
A190.1-02.....Structural Glued Laminated Timber

D. American Society of Mechanical Engineers (ASME):
B18.2.1A-96(R2005).....Square and Hex Bolts and Screws
B18.2.2-87(R2005).....Square and Hex Nuts
B18.6.1-81 (R97).....Wood Screws
B18.6.4-98(R2005).....Thread Forming and Thread Cutting Tapping Screws and Metallic Drive Screws

E. American Plywood Association (APA):

E30-03.....Engineered Wood Construction Guide

F. American Society for Testing And Materials (ASTM):

A653/A653M-07.....Steel Sheet Zinc-Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvannealed) by the Hot Dip Process

C954-04.....Steel Drill Screws for the Application of Gypsum Board or Metal Plaster Bases to Steel Studs from 0.033 inch (2.24 mm) to 0.112-inch (2.84 mm) in thickness

C1002-04.....Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Metal Studs

D143-94(R2004).....Small Clear Specimens of Timber, Method of Testing

D1760-01.....Pressure Treatment of Timber Products

F844-07.....Washers, Steel, Plan (Flat) Unhardened for General Use

F1667-05.....Nails, Spikes, and Staples

G. Federal Specifications (Fed. Spec.):

MM-L-736C.....Lumber; Hardwood

H. Commercial Item Description (CID):

A-A-55615.....Shield, Expansion (Wood Screw and Lag Bolt Self Threading Anchors)

I. Military Specification (Mil. Spec.):

MIL-L-19140E.....Lumber and Plywood, Fire-Retardant Treated

J. U.S. Department of Commerce Product Standard (PS)

PS 1-95.....Construction and Industrial Plywood

PS 20-05.....American Softwood Lumber Standard

PART 2 - PRODUCTS

2.1 LUMBER:

A. Unless otherwise specified, each piece of lumber bear grade mark, stamp, or other identifying marks indicating grades of material, and rules or standards under which produced.

1. Identifying marks in accordance with rule or standard under which material is produced, including requirements for qualifications and authority of the inspection organization, usage of authorized identification, and information included in the identification.
2. Inspection agency for lumber approved by the Board of Review, American Lumber Standards Committee, to grade species used.

B. Lumber Other Than Structural:
   1. Unless otherwise specified, species graded under the grading rules of an inspection agency approved by Board of Review, American Lumber Standards Committee.
   2. Blocking and similar items 102 mm (4 inches) and narrower Standard Grade; and, members 150 mm (6 inches) and wider, Number 2 Grade.

C. Sizes:
   1. Conforming to Prod. Std., PS20.
   2. Size references are nominal sizes, unless otherwise specified, actual sizes within manufacturing tolerances allowed by standard under which produced.

D. Moisture Content:
   1. At time of delivery and maintained at the site.
   2. Boards and lumber 51 mm (2 inches) and less in thickness: 19 percent or less.
   3. Lumber over 51 mm (2 inches) thick: 25 percent or less.

E. Fire Retardant Treatment:
   1. Mil Spec. MIL-L-19140 with piece of treated material bearing identification of testing agency and showing performance rating.
   2. Treatment and performance inspection, by an independent and qualified testing agency that establishes performance ratings.

F. Preservative Treatment:
   1. Treat wood members and plywood exposed to weather or in contact with masonry or concrete, including; blocking, shims and other members used in connection with roofing and flashing materials.
   2. Treat other members specified as preservative treated (PT).
   3. Preservative treat by the pressure method complying with ASTM D1760, except any process involving the use of Chromated Copper Arsenate (CCA) for pressure treating wood is not permitted.

2.2 PLYWOOD

A. Comply with Prod. Std., PS 1.

B. Bear the mark of a recognized association or independent inspection agency that maintains continuing control over quality of plywood which identifies compliance by veneer grade, group number, span rating where applicable, and glue type.

C. Sheathing at coping and flashing assemblies:
   1. APA Rated sheathing panels, durability classification of Exposure 1 or Exterior Span Rating of 16/0 or greater.

2.3 ROUGH HARDWARE AND ADHESIVES:

A. Miscellaneous Bolts: Expansion Bolts: C1D, A-A-55615; lag bolt, long enough to extend at least 65 mm (2-1/2 inches) into concrete. Use 13 mm (1/2 inch) bolt unless shown otherwise.

B. Washers
   1. ASTM F844.
   2. Use zinc or cadmium coated steel or cast iron for washers exposed to weather.

C. Screws:
   1. Wood to Wood: ANSI B18.6.1 or ASTM C1002.

D. Nails:
   1. Size and type best suited for purpose unless noted otherwise. Use aluminum-alloy nails, plated nails, or zinc-coated nails, for nailing wood work exposed to weather and on roof blocking.
   2. ASTM F1667:
      a. Common: Type I, Style 10.
      b. Concrete: Type I, Style 11.
      c. Barbed: Type I, Style 26.
      d. Underlayment: Type I, Style 25.

PART 3 - EXECUTION

3.1 INSTALLATION OF FRAMING AND MISCELLANEOUS WOOD MEMBERS:

A. Conform to applicable requirements of the following:
   1. AFPA WCD-number 1, Manual for House Framing for nailing and framing unless specified otherwise.

B. Fasteners:
   1. Bolts:
      a. Fit bolt heads and nuts bearing on wood with washers.
      b. Countersink bolt heads flush with the surface of nailers.
      c. Embed in concrete or use expansion bolts. Special bolts or screws designed for anchor to concrete in drilled holes may be used.
   2. Drill Screws to steel less than 2.84 mm (0.112 inch) thick.
      a. ASTM C1002 for steel less than 0.84 mm (0.033 inch) thick.
      b. ASTM C 954 for steel over 0.84 mm (0.033 inch) thick.
   3. Power actuated drive pins may be used where practical to anchor to concrete or steel.
   4. Do not anchor to wood plugs or nailing blocks in concrete. Use metal plugs, inserts or similar fastening.
   5. Screws to Join Wood:
      a. Where shown or option to nails.
      b. ASTM C1002, sized to provide not less than 25 mm (1 inch) penetration into anchorage member.

c. Spaced same as nails.

C. Blocking:

1. Install blocking where shown.
2. Use longest lengths practicable.
3. Use fire retardant treated wood blocking.

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SECTION 06 16 63

CEMENTITIOUS SHEATHING

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section specifies cement board sheathing, accessories and waterproof membrane applied to frame wall construction, ready to receive ceramic tile finishes in the following locations:

1. Staff shower rooms.
2. Patient shower room.
3. Decontamination shower room.

1.2 SUBMITTALS

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Product Data:

1. Cement board sheathing.
2. Reinforcing tape.
3. Waterproof membrane.

1.3 DELIVERY AND STORAGE

A. Deliver materials in containers with labels legible and intact.

B. Store materials so as to prevent damage or contamination.

1.4 APPLICABLE PUBLICATIONS

A. Publications listed below form a part of this specification to the extent referenced. Publications are referenced in the text by the basic designation only.

B. American National Standards Institute (ANSI):

A108.11-1999.....Interior Installation of Cementitious Backer Units
A118.9-1999.....Cementitious Backer Units

C. American Society for Testing and Materials (ASTM):

C954-04.....Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs from 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness.

PART 2 - PRODUCTS

2.1 CEMENT BOARD SHEATHING

A. Conform to ANSI A118.9, in maximum lengths available to minimize end-to-end butt joints.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the work include, but are not limited to, the following:
   a. C-Cure; C-Cure Board 990.
   b. Custom Building Products; Wonderboard.
   c. FinPan, Inc.; Util-A-Crete Concrete Backer Board.
   d. USG Corporation; DURock Cement Board.
2. Thickness: 1/2 inch.

2.2 ACCESSORY MATERIALS

A. Steel Drill Screws: ASTM C954. Modified for flat head. Bugle head not acceptable.

B. Joint Reinforcing Tape:
   1. Minimum 100 mm (4-inches) wide open mesh alkali resistant.
   2. Glass fiber mesh polymer coated as recommended by Cement Board manufacturer.

C. Waterproof Membrane: Manufacturer’s standard product that complies with ANSI A118.10 and is recommended by the manufacturer for the application indicated. Include reinforcement and accessories recommended by the manufacturer.
   1. Fabric-Reinforced, Modified Bituminous Sheet: Self-adhering, SBS-modified-bituminous sheet with woven reinforcing facing; 0.040-inch nominal thickness.
      a. Products: Subject to compliance with requirements, available products that may be incorporated into the work include, but are not limited to, the following:
         1) National Applied Construction Products, Inc.; Strataflex.

PART 3 - EXECUTION

3.1 ENVIRONMENTAL REQUIREMENTS

A. Do not install units when temperature is below 4.5 degrees Celsius (40 degrees F).

B. Do not install joint reinforcing tape when temperature is below 10 degrees Celsius (50 degrees F).

3.2 INSTALLATION

A. Remove wrapping and separate to allow air circulation for not less than seven days before installation.

B. General: Comply with TCA design installation requirements for assemblies referenced on drawings.

C. Waterproofing Installation at Rooms with Shower:
   1. Install waterproofing to comply with ANSI A108.13 and manufacturer's written instructions to produce waterproof membrane of uniform thickness and bonded securely to substrate.
   2. Do not install tile or setting materials over waterproofing until waterproofing has cured and been tested to determine that it is watertight.
   3. Coordinate with installation of shower pan to lap waterproofing over shower pan membrane or preformed shower pan flashing.

D. Installing Cement Board Units:
   1. Apply cement board sheathing immediately over waterproofing in accordance with ANSI A108.11, with rounded edges and rough side to exterior, except as specified otherwise.
   2. Secure units to framing members with screws spaced not more than 204 mm (8 inches) on center and not closer than 13 mm (1/2-inch) from the edge of the unit.
   3. Install screws so that the screw heads do not penetrate the surface of unit.
   4. Minimum bearing over framing members: 19 mm (3/4-inch.)

E. Joint and Surface Treatment: Apply joint reinforcing tape over joints, exposed edges, and corners using adhesive recommended by manufacturer.

F. Leave surface flush and ready to receive ceramic tile finish.

3.3 PROTECTION AND REPAIR

A. Patch and repair damaged surface prior to application of ceramic tile finish.
   1. Fill cracks.
   2. Replace loose, spalling or missing joint finish.
   3. Replace broken or damaged boards.

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SECTION 06 20 00
FINISH CARPENTRY, MILLWORK AND COUNTERTOPS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Items specified:
   1. Base, Wall and Full-Height Cabinets.
   2. Countertops, Backsplashes and Integral Sink Bowls.
   3. Wood Trim
   4. Impact Resistant Wall Covering (plastic laminate)
   5. Acrylic Panel Privacy Partition

B. RELATED WORK
   1. Blocking: Section 06 10 00, ROUGH CARPENTRY.
   2. Color and texture of finish: Section 09 06 00, SCHEDULE FOR FINISHES.
   3. Plumbing fixtures installed in countertops: Division 22 40 00, PLUMBING FIXTURES.
   4. Electrical light fixtures and outlets installed in or attached to millwork: Division 26, ELECTRICAL.

1.2 SUBMITTALS

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Shop Drawings:
   1. Millwork items – Half full size scale for sections and details 1:48 (1/4-inch) for elevations and plans.
   2. Show construction and installation.

C. Samples for Verification:
   1. Plastic laminates, 8 by 10 inches, for each type, color, pattern, and surface finish, with one sample applied to core material and specified edge material applied to one edge.
   2. Manufacturer’s standard of each type of finish or countertop material indicated.
   3. Wood trim, 6 by 6 inches, with specified transparent finish applied.

D. Manufacturer's literature and data:
   1. Finish hardware
   2. Chemical Resistant Laminates
   3. Countertop Materials
   4. Solid Surface Sinks

1.3 DELIVERY, STORAGE AND HANDLING

A. Protect lumber and millwork from dampness, maintaining moisture content specified both during and after delivery at site.

B. Store finishing lumber and millwork in weather tight well ventilated

structures or in space in existing buildings designated by Resident Engineer. Store at a minimum temperature of 210C (700F) for not less than 10 days before installation.

C. Pile lumber in stacks in such manner as to provide air circulation around surfaces of each piece.

1.4 QUALITY ASSURANCE

A. Comply with AWI Custom Grade Construction Standards for architectural woodwork and interior millwork unless otherwise specified.

1.5 PROJECT CONDITIONS

A. Field Measurements: Verify dimensions of millwork and countertops by field measurements. Verify countertops dimensions after base cabinets are installed but before countertop fabrication is complete.

1.6 COORDINATION

Coordinate locations of utilities and other items that will penetrate countertops and backsplashes.

PART 2 - PRODUCTS

2.1 PLASTIC-LAMINATE FACED ARCHITECTURAL CABINETS

A. Quality Standard: Unless otherwise indicated, comply with the "Architectural Woodwork Standards" for grades of architectural plastic-laminate cabinets indicated for construction, finishes, installation, and other requirements.

B. Grade: Custom.

C. Type of Construction: Frameless.

D. Cabinet, Door, and Drawer Front Interface Style: Flush overlay.

E. Reveal Dimension: As indicated.

F. High-Pressure Decorative Laminate: NEMA LD 3, grades as indicated or if not indicated, as required by woodwork quality standard.

G. Laminate Cladding for Exposed Surfaces:

1. Horizontal Surfaces: Grade HGS.
2. Postformed Surfaces: Grade HGP.
3. Vertical Surfaces: Grade HGS.
4. Edges Other Than Countertop Edges: PVC edge banding, 0.12 inch thick, matching laminate in color, pattern, and finish.

H. Materials for Semiexposed Surfaces:

1. Surfaces Other Than Drawer Bodies: High-pressure decorative laminate, NEMA LD 3, Grade VGS.
   a. Edges of Plastic-Laminate Shelves: PVC edge banding, 0.12 inch thick, matching laminate in color, pattern, and finish.
   b. Edges of Thermoset Decorative Panel Shelves: PVC or polyester edge banding.

c. For semiexposed backs of panels with exposed plastic-laminate surfaces, provide surface of high-pressure decorative laminate, NEMA LD 3, Grade VGS.

2. Drawer Sides and Backs: Thermoset decorative panels with PVC or polyester edge banding.

3. Drawer Bottoms: Thermoset decorative panels.

I. Dust Panels: 1/4-inch plywood or tempered hardboard only when above file drawers unless located directly under tops.

J. Concealed Backs of Panels with Exposed Plastic-Laminate Surfaces: High-pressure decorative laminate, NEMA LD 3, Grade BKL.

K. Drawer Construction: Fabricate with exposed fronts fastened to subfront with mounting screws from interior of body.

1. Join subfronts, backs, and sides with glued rabbeted joints supplemented by mechanical fasteners or glued dovetail joints.

2.2 PLASTIC-LAMINATE COUNTERTOPS

A. Grade: Custom.

B. High-Pressure Decorative Laminate Grade: HGS.

C. Edge Treatment: Same as laminate cladding on horizontal surfaces or vinyl edge band, refer to drawings for locations.

D. Core Material: Particleboard.

E. Core Material at Sinks: Exterior-grade plywood.

F. Backer Sheet: Provide plastic-laminate backer sheet, Grade BKL, on underside of countertops substrate.

G. Paper Backing: Provide paper backing on underside of countertop substrate.

H. Outside corners of countertops: 1-1/2″ radius.

2.3 CHEMICAL-RESISTANT PLASTIC LAMINATE COUNTERTOPS

A. Grade: Custom.

B. High-Pressure Decorative Laminate Grade: Postforming Type 390 (HGP)

C. Composition: Decorative paper is treated with melamine resin and the core is composed of kraft papers impregnated with phenolic resin to achieve chemical resistance.

D. Edge Treatment: Same as laminate cladding on horizontal surfaces or vinyl edge band, refer to drawings for locations.

E. Core Material: Particleboard.

F. Core Material at Sinks: Exterior-grade plywood.

G. Backer Sheet: Provide plastic-laminate backer sheet, Grade BKL, on underside of countertops substrate.

H. Paper Backing: Provide paper backing on underside of countertop substrate.

I. Outside corners of countertops: 1-1/2″ radius.

J. Thickness: 0.034”
K. Weight per Square Foot: 0.257#
L. Scratch Resistance: 2.5 Newtons
M. Wear Resistance: ≥400
N. Boiling Water Resistance: No Effect
O. High Temperature Resistance: Slight Effect
P. Radiant Heat Resistance: 200 seconds
Q. Stain Resistance Reagents 1-10 and 11-15: No Effect
R. Dimensional Change Machine Direction: 0.50%
S. Dimensional Change Cross Direction: 0.80%
T. Ball Impact Resistance: 60”
U. Cleanability: 10 cycles
V. Blister Resistance: 70 seconds.
W. Formability: 5/8” face; 3/16” back.
X. Appearance: No ABC defects.

2.4 SOLID-SURFACE MATERIAL COUNTERTOPS AND INTEGRAL SINK BOWLS

A. Solid surface material: Homogeneous solid sheets of filled plastic resin complying with ANSI SS1.
   1. Basis-of-Design Manufacturer: Subject to compliance with requirements, provide products by the following manufacturer:
      a. Corian® surfaces from the DuPont Surfaces
   2. Type: Provide Standard Type.
B. Configuration: Provide countertops with the following front and backsplash style:
   1. Front: 1-1/2 inch (38 mm) laminated bullnose.
   2. Backsplash: Radius edge with 3/8 inch (9.5 mm) radius.
   3. Endsplash: Matching backsplash.
C. Countertops: 3/4 inch thick, solid surface material with front edge built up with same material.
D. Backsplash: 3/4 inch thick solid surface material.
E. Integral Sink Bowls: Seamed undermount. ADA-Compliant.
   1. Basis-of-Design Model: Model 820 as manufactured by Corian, DuPont Surfaces. Inside bowl dimensions: 14 3/4 inches long x 10 1/2 inches wide x 5 1/2 inches deep.
F. Colors and Patterns: See Section 09 06 00, SCHEDULE FOR FINISHES.

2.5 QUARTZ AGGLOMERATE

A. Solid sheets consisting of quartz aggregates bound together with a matrix of filled plastic resin and complying with the “Physical Characteristics of Materials” Article of ANSI SS1.
   1. Basis-of-Design Manufacturer: Subject to compliance with requirements, provide products by the following manufacturer:

a. Zodiaq® Commercial surfaces from the DuPont Surfaces

B. Countertops: 1 1/8 inch (3cm) thick, quartz material with front edge built up with same material.

C. Backsplashes: 3/4 inch thick quartz agglomerate.

D. Colors and Patterns: See Section 09 06 00, SCHEDULE FOR FINISHES.

2.6 IMPACT RESISTANT WALL COVERING (PLASTIC-LAMINATE)

A. Grade: Custom.

B. High-Pressure Decorative Laminate Grade: HGS.

C. Core Material: Gypsum board.

D. Backer Sheet: Provide plastic-laminate back sheet, Grade BKL, on backside of substrate.

2.7 ACRYLIC PANEL PRIVACY PARTITIONS

A. Acrylic Panels (Eco Resin Panel ERP-1): Varia EcoResin as manufactured by 3form.

1. Color: Fossil Leaf Random in custom toffee color + Caramel color weave.
2. Finish: Sandstone finish front and back
3. Panel thickness: 3/8".

B. Partition posts and hardware: Versa Slim Profile as manufactured by 3form.

1. Posts: Slim One and Slim Two as required by configuration shown on plans.
2. Hardware: Include 3″ bottom plate for slim profiles, bottom plate cover, top caps, 3/8″ side brackets and polished edges for complete installation of privacy partitions.

2.8 WOOD MATERIALS

A. Wood Products: Provide materials that comply with requirements of referenced quality standard for each type of woodwork and quality grade specified unless otherwise indicated.

1. Wood Moisture Content: 5 to 10 percent.

B. Composite Wood and Agrifiber Products: Provide materials that comply with requirements of referenced quality standard for each type of woodwork and quality grade specified unless otherwise indicated.

1. Medium-Density Fiberboard: ANSI A208.2, Grade 130.
2. Particleboard: ANSI A208.1, Grade M-2-Exterior Glue.
3. Softwood Plywood: DOC PS 1, medium-density overlay.
4. Thermoset Decorative Panels: Particleboard or medium-density fiberboard finished with thermally fused, melamine-impregnated decorative paper and complying with requirements of NEMA LD 3, Grade VGL, for test methods 3.3, 3.4, 3.6, 3.8, and 3.10.

C. Hardwood Lumber Trim for Transparent Finish (Stain Finish):

1. Species and Grade: White Birch stained to match PL-2; NHLA.
2. Maximum Moisture Content: 10 percent.
3. Finger Jointing: Not allowed.
4. Gluing for Width: Not allowed.
5. Veneered Material: Not allowed.
6. Face Surface: Surfaced (smooth).
7. Matching: Selected for compatible grain and color.

2.9 ADHESIVE

A. For Plastic Laminate: Fed. Spec. A-A-1936.

B. For Interior Millwork: Unextended urea resin, unextended melamine resin, phenol resin, or resorcinol resin.

2.10 HARDWARE

A. Rough Hardware:

1. Furnish rough hardware with a standard plating, applied after punching, forming and assembly of parts; galvanized, cadmium plated, or zinc-coated by electric-galvanizing process. Galvanized where specified.
2. Fasteners:
   a. Bolts with Nuts: FF-N-836.
   b. Expansion Bolts: A-A-1922A.
   c. Screws: Fed. Spec. FF-S-111.

2.11 FINISH HARDWARE

A. Cabinet Hardware: ANSI A156.9.

1. Door/Drawer Pulls: Wire pulls, B22011, 100mm (4 inches) long, 8mm (5/16 inch) in diameter.

B. Drawer Slides:

1. Pencil Drawer Slides: Knape & Vogt #8200 or #8250 as appropriate, 75 lb. class, ¾ extensions, or approved equal.
2. Box Drawers up to 6” deep: Knape & Vogt #8300, 75 lb. class, ¾ extension, or approved equal.
3. Box Drawers over 6” deep and File Drawers: Knape & Vogt #8500, 150 lb. class, full extension, for 12” and 14” long drawers, or approved equal. Knape & Vogt #8520, 175 lb. class, full extension for drawers longer than 14”, or approved equal.
4. Pocket Drawer Slides: Blum #270E series, or approved equal.

C. Shelf Clips: Hafele #282.04.524, plug-in 32mm spoon type, or approved equal.

D. Shelf Brackets: Hafele 287.35.159, or approved equal.

E. Concealed (European Type) Hinges: B01602, Blum self-closing, full overlay, 125°, nickel plated, clip style, or approved equal.

F. Door Locks: E07121. Keyed alike within an area, different areas keyed

differently.

G. Drawer Locks: E07041. Keyed alike within an area, different areas keyed differently.

H. Door Silencers: Clear plastic with self-adhesive.

I. Cabinet Locks: ANSI A156.11.
   1. Drawers and Hinged Door: E07262.
   2. Sliding Door: E07162.

J. Auxiliary Hardware: ANSI A156.16.

K. Shelf Bracket: B04041, japanned or enameled finish.

L. Countertop/Casework Support Brackets:
   1. Federal Brace Streamline Countertop Bracket 34450, or approved equal.
   2. 14″ x 14″ angle manufactured from 7 gauge steel.
   3. Prime and paint to match wall.

M. Edge Strips Moldings:
   1. Driven type "T" shape with serrated retaining stem; vinyl plastic to match plastic laminate color, stainless steel, or 3 mm (1/8 inch) thick extruded aluminum.

N. Rubber or Vinyl molding
   1. Rubber or vinyl standard stock and in longest lengths practicable.
   2. Design for closures at joints with walls and adhesive anchorage.
   3. Adhesive as recommended by molding manufacturer.

O. Primers: Manufacturer's standard primer for steel providing baked enamel finish.

P. Plastic-Impregnated-Cork Tackboard: 1/4-inch-thick, plastic-impregnated cork sheet factory laminated to 1/4-inch-thick fiberboard backing.

2.12 MOISTURE CONTENT

A. Moisture content of lumber and millwork at time of delivery to site.
   1. Interior finish lumber, trim, and millwork 32 mm (1-1/4 inches) or less in nominal thickness: 12 percent on 85 percent of the pieces and 15 percent on the remainder.
   2. Exterior treated or untreated finish lumber and trim 100 mm (4 inches) or less in nominal thickness: 15 percent.
   3. Moisture content of other materials shall be in accordance with the standards under which the products are produced.

2.13 PRESERVATIVE TREATMENT

A. Wood members in contact with concrete, including wood members used for rough framing of millwork items except heart-wood Redwood and Western Red Cedar shall be preservative treated in accordance with AWPA Standards.

2.14 FABRICATION

A. General:

1. Except as otherwise specified, use AWI Custom Grade for architectural woodwork and interior millwork.
2. Finish woodwork shall be free from pitch pockets.
3. Back out or kerf backs of wood trim except those with ends exposed in finished work.
4. Ease edges of lumber less than 1 inch in nominal thickness to 1/16-inch radius and edges of lumber 1 inch or more in nominal thickness to 1/8-inch radius.
5. Plywood shall be not less than 13 mm (1/2 inch), unless otherwise shown or specified.
6. Edges of members in contact with concrete or masonry shall have a square corner caulking rebate.
7. Fabricate members less than 4 m (14 feet) in length from one piece of lumber, back channeled and molded as shown.
8. Plastic Laminate Work:
   a. Factory glued to either plywood or a particle board core, thickness as shown or specified.
   b. Cover exposed edges with plastic laminate, except where aluminum, stainless steel, or plastic molded edge strips are shown or specified. Use plastic molded edge strips on 19 mm (3/4-inch) molded thick or thinner core material.
   c. Provide plastic backing sheet on underside of countertops, vanity tops, thru-wall counter and sills including back splashes and end splashes of countertops.
   d. Use backing sheet on concealed large panel surface when decorative face does not occur.

B. Mounting Strips and Shelves:
1. Cut mounting strips from 25 mm by 100 mm (1 by 4 inches) softwood stock, with exposed edge slightly rounded.
2. Plastic laminate covered, 19 mm (3/4 inch) thick plywood or particle board core with edges and ends having plastic molded edge strips. Size, finish and number as shown.

C. General Countertops:
1. Fabrication with plastic laminate over 32 mm (1-1/4 inch) thick core unless shown otherwise.
   a. Use decorative laminate for exposed edges of tops 38 mm (1-1/2 inches) wide and on back splash and end splash. Use plastic or metal edges for top edges less than 38 mm (1-1/2 inches) wide.
   b. Assemble back splash and end splash to counter top.
   c. Use one piece counters for straight runs.
   d. Miter corners for field joints with overlapping blocking on

underside of joint.

D. Solid-Surface-Material Countertops:
   1. Fabricate tops in one piece with shop-applied edges unless otherwise indicated. Comply with solid-surface-material manufacturer's written instructions for adhesives, sealers, fabrication and finishing.
      a. Fabricate with loose backsplashes for field assembly.
      b. Install integral sink bowls in countertops in the shop.
      c. Provide either one or three holes as required for sink faucet and controls. Coordinate with Plumbing Fixture Schedule.

E. Quartz Agglomerate Countertops:
   1. Fabricate tops in one piece with shop-applied edges and unless otherwise indicated. Comply with quartz agglomerate manufacturer's written instructions for adhesives, sealers, fabrication and finishing.
      a. Fabricate with loose backsplashes for field assembly.

F. Impact Resistant Wall Covering (Plastic Laminate):
   1. Fabricate with plastic laminate over 16 mm (5/8 inch) thick core.
   2. Use decorative laminate for all exposed edges.
   3. Miter corners for joints with overlapping blocking on underside of joint.
   4. No exposed fasteners will be allowed.

PART 3 - EXECUTION

3.1 ENVIRONMENTAL REQUIREMENTS

A. Maintain work areas and storage areas to a minimum temperature of 210C (700F) for not less than 10 days before and during installation of interior millwork.

B. Do not install finish lumber or millwork in any room or space where wet process systems such as concrete or masonry work is not complete and dry.

3.2 INSTALLATION

A. General:
   1. Install countertops to a level tolerance of 1/8" in 8 feet.
   2. Fasten countertops by screwing through corner blocks of base units into underside of countertop. Pre-drill holes for screws as recommended by manufacturer. Align adjacent surfaces and, using adhesive in color to match countertop, form seams to comply with manufacturer's written instructions. Carefully dress joints smooth, remove surface scratches, and clean entire surface.
      a. Install backsplashes and endsplashes to comply with manufacturer's written instructions for adhesives, sealers, fabrication and finishing.

b. Seal edges of cutouts in particleboard subtops by saturating with varnish.

3. Millwork receiving transparent finish shall be primed and back-painted on concealed surfaces. Set no millwork until primed and back-painted.
4. Secure trim with fine finishing nails, screws, or glue as required.
5. Set nails for putty stopping. Use washers under bolt heads where no other bearing plate occurs.
6. Seal cut edges of preservative and fire retardant treated wood materials with a certified acceptable sealer.
7. Coordinate with plumbing and electrical work for installation of fixtures and service connections in millwork items.
8. Plumb and level items unless shown otherwise.
9. Nail finish at each blocking, lookout, or other nailer and intermediate points; toggle or expansion bolt in place where nails are not suitable.
10. Install acrylic panel privacy partitions per manufacturer’s written instructions.

B. Trim Installation

1. Install with minimum number of joints practical, using full-length pieces from maximum lengths of lumber available. Do not use pieces less than 24 inches long, except where necessary. Stagger joints in adjacent and related standing and running trim. [Cope] [Miter] at returns, miter at outside corners, and cope at inside corners to produce tight-fitting joints with full-surface contact throughout length of joint. Use scarf joints for end-to-end joints. Plane backs of casings to provide uniform thickness across joints where necessary for alignment.
   a. Match color and grain pattern of trim for transparent finish (stain or clear finish) across joints.
   b. Install trim after gypsum-board joint finishing operations are completed.
   c. Install without splitting; drill pilot holes before fastening where necessary to prevent splitting. Fasten to prevent movement or warping. Countersink fastener heads on exposed carpentry work and fill holes.

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SECTION 07 21 13
THERMAL INSULATION

PART 1 - GENERAL

1.1 DESCRIPTION:

A. This section specifies thermal and acoustical insulation for buildings.

B. Acoustical insulation is identified by thickness and words "Acoustical Insulation".

C. Vapor retarders.

1.2 RELATED WORK

A. Insulation in connection with roofing and waterproofing: Section 07 22 00, ROOF AND DECK INSULATION.

B. Safing insulation: Section 07 84 00, FIRESTOPPING.

1.3 SUBMITTALS:

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Manufacturer's Literature and Data:

1. Insulation, each type used
2. Adhesive, each type used.
3. Tape

C. Certificates: Stating the type, thickness and "R" value (thermal resistance) of the insulation to be installed.

1.4 STORAGE AND HANDLING:

A. Store insulation materials in weathertight enclosure.

B. Protect insulation from damage from handling, weather and construction operations before, during, and after installation.

1.5 APPLICABLE PUBLICATIONS:

A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by basic designation only.

B. American Society for Testing and Materials (ASTM):

C552-07.....Cellular Glass Thermal Insulation.

C591-08.....Unfaced Preformed Rigid Cellular Polyisocynurate Thermal Insulation

C954-07.....Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Base to Steel Studs From 0.033 (0.84 mm) inch to 0.112 inch (2.84 mm) in thickness

C1002-07.....Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs

E84-08.....Surface Burning Characteristics of Building Materials

F1667-05.....Driven Fasteners: Nails, Spikes and Staples.

PART 2 - PRODUCTS

2.1 INSULATION – GENERAL:

A. Where thermal resistance ("R" value) is specified or shown for insulation, the thickness shown on the drawings is nominal. Use only insulation with actual thickness that is not less than that required to provide the thermal resistance specified.

B. Where "R" value is not specified for insulation, use the thickness shown on the drawings.

C. Where more than one type of insulation is specified, the type of insulation for each use is optional, except use only one type of insulation in any particular area.

D. Insulation Products shall comply with following minimum content standards for recovered materials:

Material Type	Percent by Weight
XPS Extruded Polystyrene	9 percent recovered material
Foam-in-place	5 percent recovered material
Glass fiber reinforced	6 percent recovered material

The minimum-content standards are based on the weight (not the volume) of the material in the insulating core only.

2.2 PERIMETER INSULATION IN CONTACT WITH SOIL:

A. Extruded Polystyrene Board: ASTM C578, Type IV, where covered by soil or concrete.

2.3 EXTERIOR FRAMING INSULATION:

A. Batt or Blanket: Optional.

B. Mineral Fiber: ASTM C665, Type II, Class C, Category I where framing is faced with gypsum board.

C. Mineral Fiber: ASTM C665, Type III, Class A where framing is not faced with gypsum board.

2.4 ACOUSTICAL INSULATION:

A. Use same product as for exterior framing.

B. Thickness as shown; of widths and lengths to fit tight against framing.

2.5 VAPOR RETARDERS

A. Reinforced-Polyethylene Vapor Retarders: Two outer layers of polyethylene film laminated to an inner reinforcing layer consisting of either nylon cord or polyester scrim and weighing not less than 25 lb/1000 sq. ft. (12 kg/100 sq. m), with maximum permanence rating of 0.0507 perm (2.9 ng/Pa x s x sq. m).

1. Products: Subject to compliance with requirements available products that may be incorporated into the Work include, but are not limited to, the following:
   a. Raven Industries Inc.; DURA-SKRIM 6WW.
   b. Reef Industries, Inc.; Griffolyn T-65.

B. Vapor-Retarder Tape: Pressure-sensitive tape of type recommended by vapor-retarder manufacturer for sealing joints and penetrations in vapor retarder.

2.6 FASTENERS:

A. Staples or Nails: ASTM F1667, zinc-coated, size and type best suited for purpose.

B. Screws: ASTM C954 or C1002, size and length best suited for purpose with washer not less than 51 mm (two inches) in diameter.

C. Impaling Pins: Steel pins with head not less than 50 mm (two inches) in diameter with adhesive for anchorage to substrate. Provide impaling pins of length to extend beyond insulation and retain cap washer when washer is placed on the pin.

D. Vapor-Retarder Fasteners: Pancake-head, self-tapping steel drill screws; with fender washers.

E. Single-Component Nonsag Urethane Sealant: ASTM C 920, Type I, Grade NS, Class 25, Use NT related to exposure, and Use O related to vapor-barrier-related substrates.

2.7 ADHESIVE:

A. As recommended by the manufacturer of the insulation.

2.8 TAPE:

A. Pressure sensitive adhesive on one face.

B. Perm rating of not more than 0.50.

PART 3 - EXECUTION

3.1 INSTALLATION - GENERAL

A. Install insulation with the vapor barrier facing the heated side, unless specified otherwise.

B. Install rigid insulating units with joints close and flush, in regular courses and with cross joints broken.

C. Install batt or blanket insulation with tight joints and filling framing void completely. Seal cuts, tears, and unlapped joints with tape.

D. Fit insulation tight against adjoining construction and penetrations, unless specified otherwise.

3.2 PERIMETER FOUNDATION INSULATION:

A. Vertical insulation:

1. Fill joints of insulation with same material used for bonding.
2. Bond extruded polystyrene board to surfaces with adhesive applied in accordance with recommendations of insulation manufacturer.

3.3 EXTERIOR FRAMING OR FURRING BLANKET INSULATION:

A. Pack insulation around door frames and windows and in building expansion joints, door soffits and other voids. Pack behind outlets around pipes, ducts, and services encased in walls. Open voids are not permitted. Hold insulation in place with pressure sensitive tape.

B. Lap vapor retarder flanges together over face of framing for continuous surface. Seal all penetrations through the insulation.

C. Fasten blanket insulation between metal studs or framing and exterior wall furring by continuous pressure sensitive tape along flanged edges.

D. Soffit Insulation:

1. At metal framing or ceilings suspension systems, install blanket insulation above suspended ceilings or metal framing at right angles to the main runners or framing. Tape insulation tightly together so no gaps occur and metal framing members are covered by insulation.
2. In areas where suspended ceilings adjoin areas without suspended ceilings, install either blanket, batt, or mineral fiberboard extending from the suspended ceiling to underside of deck or slab above. Secure in place to prevent collapse or separation of hung blanket, batt, or board insulation and maintain in vertical position. Secure blanket or batt with continuous cleats to structure above.

3.4 ACOUSTICAL INSULATION:

A. Fasten blanket insulation between metal studs and wall furring with continuous pressure sensitive tape along edges or adhesive.

B. Pack insulation around door frames and windows and in cracks, expansion joints, control joints, door soffits and other voids. Pack behind outlets, around pipes, ducts, and services encased in wall or

partition. Hold insulation in place with pressure sensitive tape or adhesive.

C. Do not compress insulation below required thickness except where embedded items prevent required thickness.

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SECTION 07 22 00
ROOF AND DECK INSULATION

PART 1 - GENERAL

1.1 DESCRIPTION

A. Roof and deck insulation, substrate board, vapor retarder, on new construction ready to receive roofing or waterproofing membrane.

1.2 RELATED WORK

A. Wood cants, blocking, and edge strips: Section 06 10 00, ROUGH CARPENTRY.

B. Perimeter, rigid, and batt or blanket insulation not part of roofing system: Section 07 21 13, THERMAL INSULATION.

c. Building Roofing System: Section 07 54 23 THERMOPLASTIC POLYOLEFIN (TPO) ROOFING.

D. Sheet metal components and wind uplift requirements for roof-edge design: Section 07 60 00, FLASHING AND SHEET METAL.

1.3 APPLICABLE PUBLICATIONS

A. Publications listed below form a part of this specification to the extent referenced. Publications are referenced in the text by the basic designation only. Editions of applicable publications current on date of issue of bidding documents apply unless otherwise indicated.

B. American Society of Heating, Refrigeration and Air Conditioning (ASHRAE):

90.1-07.....Energy Standard for Buildings Except Low-Rise Residential Buildings

C. ASTM International (ASTM):

C1177/C1177M-08.....Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing

C1289-10.....Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board

D2822-05.....Asphalt Roof Cement

D4586-07.....Standard Specification for Asphalt Roof Cement, Asbestos-Free

E84-09.....Standard Test Method for Surface Burning Characteristics of Building Material

D. FM Approvals: RoofNav Approved Roofing Assemblies and Products.

4450-89.....Approved Standard for Class 1 Insulated Steel Deck Roofs
4470-10.....Approved Standard for Class 1 Roof Coverings
1-28-09.....Loss Prevention Data Sheet: Design Wind Loads.
1-29-09.....Loss Prevention Data Sheet: Above-Deck Roof Components
1-49-09.....Loss Prevention Data Sheet: Perimeter Flashing

E. National Roofing Contractors Association: Roofing and Waterproofing Manual
F. U.S. Department of Agriculture (USDA): USDA BioPreferred Catalog, www.biopreferred.gov
G. Underwriters Laboratories, Inc. (UL): Fire Resistance Directory (2009)

1.4 PERFORMANCE REQUIREMENTS

A. Thermal Performance: Provide roof insulation meeting minimum overall average R-value of 41, with minimum R-value at any location of 20.
B. FM Approvals: Provide roof insulation complying with requirements in FM Approvals 4450 and 4470 as part of specified roofing system, listed in FM Approvals "RoofNav" as part of roofing system meeting Fire/Windstorm Classification in Division 07 roofing section.

1.5 QUALITY CONTROL

A. Requirements of Division 07 roofing section for qualifications of roofing system insulation Installer; Work of this Section shall be performed by same Installer.
B. Requirements of Division 07 roofing section for inspection of Work of this Section and qualifications of Inspector.
C. Unless specified otherwise, comply with the recommendations of the NRCA "Roofing and Waterproofing Manual" applicable to insulation for storage, handling, and application.
D. Requirements of roofing system uplift pressure design for specified roofing system.
E. Requirements of applicable FM Approval for specified roofing system insulation attachment.
F. Bio-Based Materials: Where applicable, provide products designated by USDA and meeting or exceeding USDA recommendations for bio-based content.

1.6 SUBMITTALS

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Product Data:

1. Roof insulation, each type.
2. Substrate board, each type.
3. Direct adhered requirements.

C. Shop Drawings: Include plans, sections, details, and attachments.

1. Nailers, cants, and terminations.
2. Layout of insulation showing slopes, tapers, penetration, and edge conditions.

D. Certificates:

1. Indicating type, thermal conductance, and minimum and average thickness of insulation.
2. Indicating materials and method of application of insulation system meet the requirements of FM Approvals for specified roofing system.

1.7 DELIVERY, STORAGE AND MARKING

A. Comply with the recommendations of the NRCA "Roofing and Waterproofing Manual" applicable to built-up roofing for storage, handling and installation requirements.

1.8 QUALITY ASSURANCE:

A. Roof insulation on combustible or steel decks shall have a flame spread rating not greater than 75 and a smoke developed rating not greater than 150, exclusive of covering, when tested in accordance with ASTM E84, or shall have successfully passed FM Approvals 4450.

1. Insulation bearing the UL label and listed in the UL Building Materials Directory as meeting the flame spread and smoke developed ratings will be accepted in-lieu-of copies of test reports.
2. Compliance with flame spread and smoke developed ratings will not be required when insulation has been tested as part of a roof construction assembly of the particular type used for this project and the construction is listed as fire-classified in the UL Building Materials Directory or listed as Class I roof deck construction in the FM Approvals "RoofNav."
3. Insulation tested as part of a roof construction assembly shall bear UL or FM labels attesting to the ratings specified herein.

PART 2 - PRODUCTS

2.1 ADHESIVE MATERIALS

A. Adhesive Materials, General: Adhesive and sealant materials recommended by roofing system manufacturer for intended use, identical to materials utilized in approved listed roofing system, and compatible with roofing membrane.
   1. Liquid-type adhesive materials shall comply with VOC limits of authorities having jurisdiction.
   2. Adhesives and sealants that are not on the exterior side of weather barrier shall comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
      a. Plastic Foam Adhesives: 50 g/L.
      b. Multipurpose Construction Adhesives: 70 g/L.
      c. Fiberglass Adhesives: 80 g/L.
      d. Contact Adhesives: 80 g/L.
      e. Other Adhesives: 250 g/L.
      f. Nonmembrane Roof Sealants: 300 g/L.
      g. Sealant Primers for Nonporous Substrates: 250 g/L.
      h. Sealant Primers for Porous Substrates: 775 g/L.

B. Primer: ASTM D41.

C. Asphalt: ASTM D312, Type III or IV for vapor retarders and insulation.

D. Modified Asphaltic Insulation Adhesive: Insulation manufacturer's recommended modified asphaltic, asbestos-free, cold-applied adhesive formulated to attach roof insulation to substrate or to another insulation layer.

E. Bead-Applied Urethane Insulation Adhesive: Insulation manufacturer's recommended bead-applied, low-rise, one- or multicomponent urethane adhesive formulated to attach roof insulation to substrate or to another insulation layer.

F. Full-Spread Applied Urethane Insulation Adhesive: Insulation manufacturer's recommended spray-applied, low-rise, two-component urethane adhesive formulated to attach roof insulation to substrate or to another insulation layer.

G. Roof Cement: Asbestos free, ASTM D2822, Type I or Type II, ; or, D4586, Type I or Type II.

2.2 ROOF AND DECK INSULATION

A. Roof and Deck Insulation, General: Preformed roof insulation boards approved by roofing manufacturer and listed as component of FM Approvals-approved roofing system.

B. Polyisocyanurate Board Insulation: ASTM C1289, Type II, Class 1, Grade 2, felt or glass-fiber mat facer on both major surfaces.

C. Tapered Roof Insulation System:

1. Fabricate of polyisocyanurate. Use only factory-tapered insulation.
2. Cut to provide high and low points with crickets and slopes as shown.
3. Minimum thickness of tapered sections; 38 mm (1-1/2 inch).
4. Minimum slope 1:48 (1/4 inch per 12 inches).

2.3 INSULATION ACCESSORIES

A. Cants and Tapered Edge Strips:

1. Wood Cant Strips: Refer to Division 06 Section "Rough Carpentry."

B. Vapor Retarder:

1. Self-Adhering Sheet Vapor Retarder: ASTM D1970, minimum of 1.0-mm- (40-mil-) thick, polyethylene film laminated to layer of rubberized asphalt adhesive, or 0.76- to 1.0-mm- (30- to 40-mil-) thick, polyethylene film laminated to layer of butyl rubber adhesive; maximum permeance rating of 6 ng/Pa x s x sq. m (0.1 perm).

C. Substrate Board:

1. Glass-mat, water-resistant gypsum substrate, ASTM C1177/C1177M, 13 mm (1/2 inch), Type X, 16 mm (5/8 inch) thick, factory primed.

2.4 FASTENERS

A. Fasteners: Mechanical fastners shall not be permitted.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Comply with requirements of Division 07 roofing section.

3.2 PREPARATION

A. Comply with requirements of Division 07 roofing section.

3.3 SUBSTRATE BOARD INSTALLATION

A. Adhere substrate board to top flanges of steel deck to resist uplift pressures according to roofing system manufacturer’s instructions and requirements of FM Approvals listing for specified roofing system.

3.4 VAPOR RETARDER INSTALLATION

A. General:

1. Install continuous vapor retarder on top of substrate board or concrete deck as indicated on drawings and in compliance with manufacturer’s requirements..
2. At vertical surfaces, turn up vapor retarder to top of insulation or base flashing.
3. At all pipes, walls, and similar penetrations through vapor retarder, seal openings with roof cement to prevent moisture entry from below.
4. Seal penetrations with roof cement.

B. Cast in Place Concrete Decks:

1. Prime deck as specified.
2. Apply vapor retarder to top of concrete deck.

C. Steel Deck:

1. Material and method of application of roofing systems used on metal decks shall meet the requirements of FM Approvals for Class I-A Insulated Steel Roof Deck.
2. Attach substrate board and subsequent components to meet the requirements of FM Approval's "RoofNav" listing for specified system meeting Fire/Windstorm Classification indicated in Division 07 roofing section.
3. Locate the long dimension edge joints to have solid bearing on top of decking ribs; do not cantilever over rib openings or flutes.

3.5 RIGID INSULATION INSTALLATION

A. Insulation Installation, General:

1. Install roof insulation in accordance with roofing system manufacturer's written instructions.
2. Install roof insulation in accordance with requirements of FM Approval's Listing for specified roofing system.
3. Cant Strips: Install wood cant strips specified in Division 06 Section ROUGH CARPENTRY at junctures of roofing system with vertical construction.

B. Insulation Thickness:

1. Thickness of roof insulation shown on drawings is nominal. Actual thickness shall provide the average thermal resistance "R" value of not less than that specified in Performance Requirements Article.

2. Insulation on Metal Decks: Provide minimum thickness of insulation for metal decks recommended by the insulation manufacturer to span rib opening (flute size) of metal deck used. Support edges of insulation on metal deck ribs.
3. When thickness of insulation to be used is more or less than that shown on the drawings, make adjustments in the alignment and location of roof drains, flashing and similar items at no additional cost to the Government.
4. Where tapered insulation is used, the thickness of the insulation at high points and roof edges shall be as shown on the drawings; the thickness at the low point (drains) shall be not less than 38 mm (1-1/2 inches) or as detailed.
5. Use not less than two layers of insulation when insulation is 68 mm (2.7 inch) or more in thickness unless specified otherwise. Stagger joints minimum 152 mm (6 inches).

C. Lay insulating units with close joints, in regular courses and with cross joints broken. When laid in more than one layer, break joints of succeeding layers of roof insulation with those in preceding layer.
D. Lay units with long dimension perpendicular to the rolled (longitudinal) direction of the vapor retarder.
E. Seal all cut edges at penetrations and at edges against blocking with bitumen or roof cement.

F. Cut to fit tight against blocking or penetrations.
G. Cover all insulation installed on the same day; comply with temporary protection requirements of Division 07 roofing section.
H. Installation Method:
   1. Adhered Insulation:
      a. Prime substrate as required.
      b. Set each layer of insulation firmly in solid mopping of hot asphalt.
      c. Set each layer of insulation firmly in ribbons of bead-applied insulation adhesive.
      d. Set each layer of insulation firmly in uniform application of full-spread insulation adhesive.

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SECTION 07 25 00

WEATHER BARRIERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Building wrap.
2. Seam / Penetration Tape.
3. Flexible flashing.
4. Preformed window and door corners.
5. Fasteners.

B. Related Requirements:

1. Section 04 20 00 "Unit Masonry".
2. Section 07 40 00 "Roof and Wall Panels”.
3. Section 09 29 00 “Gypsum Board and Gypsum Sheathing”

1.3 ACTION SUBMITTALS

A. Product Data: Submit manufacturer’s current technical data for each component.

1. For building wrap, include data on air and water-vapor permeance based on testing according to referenced standards showing compliance with the indicated requirements.

B. Product Data: Submit manufacturer’s current details and installation instructions for the water resistive weather-barrier membrane components and accessories.

1.4 QUALITY ASSURANCE

A. Single Source: Water-resistive weather barrier membrane and components and accessories must be obtained as a single-source system to senure total system compatibility and integrity.

B. Manufacturer’s Field Service Reports: Provide site reports from authorized filed service representative, indicating observation of weather barrier assembly installation.

C. Pre-installation Conference: Contractor shall conduct a meeting one-week prior to the commencement of work at the project site. All trades responsible for creating a continuous plane of water tightness are to be present.

1.5 WARRANTY

A. Manufacturer's weather-barrier Warranty for the total membrane system including components and accessories installed in accordance with the manufacturer's instruction that have failed within a ten (10) year period of time.

PART 2 - PRODUCTS

2.1 WATER-RESISTIVE BARRIER

A. Building Wrap: ASTM E 1677, Type I air barrier; with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, when tested according to ASTM E 84; UV stabilized; and acceptable to authorities having jurisdiction.

1. Basis of Design Products: Subject to compliance with requirements, provide materials and installation procedures for Water-Resistive Vapor Permeable Air Barrier Membrane System; a mechanically attached with a vapor permeance rating of at least 50 perms (2875ng/PA.s.m^2)

a. VaporShield: WallSheild.

2. Water-Vapor Permeance: Not less than 50 perms (2875 ng/Pa x s x sq. m) per ASTM E 96/E 96M, Desiccant Method (Procedure A).

3. Air Permeance: Not more than 0.002 cfm/sq. ft. at 0.3-inch wg (0.02 L/s x sq. m at 75 Pa) when tested according to ASTM E 2178.

4. Allowable UV Exposure Time: Not less than three months.

B. Building-Wrap Seam/Penetration Tape: Pressure-sensitive plastic tape recommended by building-wrap manufacturer for sealing joints and penetrations in building wrap.

2.2 MISCELLANEOUS MATERIALS

A. Flexible Flashing: Composite, self-adhering, flashing product consisting of a pliable, butyl rubber or rubberized-asphalt compound, bonded to a high-density polyethylene film, aluminum foil, or spunbonded polyolefin to produce an overall thickness of not less than 0.030 inch (0.8 mm).

B. Primer for Flexible Flashing: Product recommended by manufacturer of flexible flashing for substrate.

C. Membrane Fasteners: Weather-resistive air 1¾" diameter plastic cap.

D. Preformed Window and Door Corners: preformed 90 degree inside corner membrane with the same vapor permeance and resistance to air leakage properties as the primary air barrier membrane.

E. Penetration sealant Sealants complying with ASTM C920, elastomeric polymer sealant to maintain watertight conditions, as recommended by weather barrier manufacturer.

PART 3 - EXECUTION

3.1 GENERAL

A. Verify that surfaces and conditions are ready to accept the Work of this section. Mechanical fasteners used to secure sheathing shall be set flush and fastened into solid backing.

3.2 WATER-RESISTIVE BARRIER INSTALLATION

A. Cover exposed exterior surface of sheathing with water-resistive barrier securely fastened to framing immediately after sheathing is installed and prior to installation of doors, windows and louvers.

B. Cover sheathing with water-resistive barrier as follows:

1. Cut back barrier 1/2 inch (13 mm) on each side of the break in supporting members at expansion- or control-joint locations.

2. Apply barrier to cover vertical flashing with a minimum 4-inch (100-mm) overlap unless otherwise indicated.

3. Extend 6-12 inches beyond corners to overlap.

4. Seams shall have a minimum of 6 inch overlap.

C. Masonry Ties, battens and/or clips for cladding systems may be used as the attachment method. Secure ties and clips with corrosion resistive gasketed fasteners. Coordinate installation of air membrane system with cladding contractor and seal all penetrations as required by manufacturer.

D. Use additional mechanical fasteners in the field and tape joints if membrane will be left exposed for prolonged periods prior to installation of cladding.

3.3 FLEXIBLE FLASHING INSTALLATION

A. Apply flexible flashing where indicated to comply with manufacturer's written instructions.

1. Prime substrates as recommended by flashing manufacturer.

2. Lap seams and junctures with other materials at least 4 inches (100 mm) except that at flashing flanges of other construction, laps need not exceed flange width.

3. Lap flashing over water-resistive barrier at bottom and sides of openings.

4. Lap water-resistive barrier over flashing at heads of openings.

5. After flashing has been applied, roll surfaces with a hard rubber or metal roller to ensure that flashing is completely adhered to substrates.

3.4 BUILDING TRANSITION CONDITIONS

A. Tie-in to structural beams, columns, floor slabs and intermittent floors, parapets, foundation walls and at the interface of dissimilar materials with self-adhering air-barrier transition and flashing membrane. Comply with manufacturer's written instructions.

1. Ensure 3 inch overlap.

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SECTION 07 40 00
ROOFING AND SIDING PANELS

PART 1 - GENERAL

1.1 DESCRIPTION

This section specifies preformed uninsulated sheet metal wall and soffit panels as shown.

1.2 RELATED WORK

A. Sealant: Section 07 92 00, JOINT SEALANTS.

B. Color and texture of finish: Section 09 06 00, SCHEDULE FOR FINISHES.

1.3 MANUFACTURER'S QUALIFICATIONS

Metal wall and soffit panels shall be products of a manufacturer regularly engaged in the fabrication and erection of metal panels of the type and design shown and specified.

1.4 SUBMITTALS

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Samples: Metal panel, 25mm (one inch) square of all available manufactures standard colors for Architect’s initial selection

C. Samples: Metal panel, two 150 mm (six inch) square, of each color and texture selected.

D. Shop Drawings: Wall and soffit panels; showing details of construction, panel layout and installation, thickness and kind of material, closures, flashing, fastenings and related components and accessories.

E. Manufacturer's Literature and Data: Wall and soffit panels

1.5 APPLICABLE PUBLICATIONS

A. The publications listed below form a part of this specification to the extend referenced. The publications are referenced in the text by the basic designation only.

B. American Society for Testing and Materials (ASTM):

A653/A653M-07..... Steel Sheet, Zinc-Coated (Galvanized), or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

A924/A924M-07..... Steel Sheet, Metallic Coated by the Hot-Dip Process

A1008/A1008M-07..... Steel, Sheet, Cold-Rolled, Carbon, Structural, High Strength Low Alloy

C442-04(E2004)..... Gypsum Backing Board, Gypsum Coreboard, and Gypsum Shaftliner Board

1.6 WARRANTY

A. Material shall have a twenty (20) year warranty against failure due to corrosion, rupture or perforation.

B. Finish shall have a twenty (20) year warranty against failure due to cracking, peeling, and fade (not to exceed 5 n.b.s. units).

PART 2 - PRODUCTS

2.1 GENERAL

A. Wall Panel; Basis-of-Design Product:
1. Berridge Manufacturing Company
2. HR-16 Wall Panel
3. 16" (400), 24 gauge multi-rib panel.

B. Soffit Panel; Basis-of-Design Product:
4. Berridge Manufacturing Company
5. FW-12 Soffit panel
6. 12" (300), 24 gauge smooth perforated panel.

2.2 SHEET STEEL

A. Prefinished Metal shall be [Hot-Dipped Galvanized - ASTM A653-94 Grade C G90 Coating A924-94 24 Gauge core steel].

B. Finish shall be full strength Kynar 500 PVDF resin-based coating, applied by the manufacturer on a continuous coil coating line, with a top side dry film thickness of 0.70 to 0.80 mil over 0.20 to 0.30 mil prime coat, to provide a total topside dry film thickness of 1.0 plus or minus 0.10 mil. Reverse side shall be coated with primer and wash coat of 0.30 mil plus or minus 0.05 mil. Finish shall conform to all tests for adhesion, flexibility, and longevity as specified by the Kynar 500 PVDF resin-based coating supplier.

C. Strippable film shall be applied to the top side of the painted coil to protect the finish during fabrication, shipping and field handling. This strippable film must be removed immediately before installation.

2.3 FASTENERS

Fasteners for steel panels shall be galvanized or cadmium plated steel. Fasteners of size, type and holding strength as recommended by manufacturer.

2.4 FABRICATION

A. Uninsulated metal wall and roof panels shall be single sheets, of approximate overall depth and configuration shown on drawings.

Connection between panels shall be by interlocking joints filled with sealing compound as recommended by the manufacturer. Furnish wall panels in lengths which minimize joints and provide for staggered pattern as required by manufacturer, except at openings. Furnish soffit panels in one continuous length of span and provide cut-outs as required for passage of pipes, conduits, recessed lighting and the like. Construct panels as follows:

1. Wall panels:
   a. 24 gage thick galvanized steel.
2. Soffit Panels:
   a. 24 gage thick galvanized steel.
3. Accessories and flashing shall be the same material and finish as the panels. Thickness and installation of accessories and flashing shall be as recommended by the panel manufacturer.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Install panels in accordance with the manufacturer's approved erection instructions and diagrams, except as specified otherwise. Panels shall be in full and firm contact with supports and with each other at side and end laps. Where panels are cut in the field, or where any of the factory applied coverings or coatings are abraded or damaged in handling or installation, they shall, after the necessary repairs have been made with material of the same type and color as the weather coating, be approved before being installed. All cut ends and edges, including those at openings through the sheets shall be sealed completely. Correct defects or errors in the materials in an approved manner. Replace materials which cannot be corrected in an approved manner with nondefective material. Remove protective strippable film prior to installation of panels. Do not allow panels or trim to come in contact with dissimilar materials.

B. Wall Panels: Apply panels with the configuration in a horizontal position. Provide panels in the longest obtainable lengths, with end laps occurring only at structural members. Seal side and end laps with joint sealing material. Flash and seal walls at the base, at the top, around windows, door frames, framed louvers, and other similar openings. Install closure strips, flashings, and sealing material in an approved manner that will assure complete weather tightness. Flashing will not be required where approved "self-flashing" panels are used.

C. Soffit Panels: Provide soffit panels in full lengths with no transverse joints except at the junction of accessory penetrations. Lay all side laps away from the prevailing wind, and seal side and end laps with joint sealing material. Flash and seal at penetrations, and elsewhere as necessary. Install closure strips, flashing, and sealing material in an approved manner that will assure complete weather tightness.

D. Flashing: All flashing and related closures and accessories in connection with the preformed metal panels shall be provided as indicated and as necessary to provide a watertight installation. Details of installation, which are not indicated, shall be in accordance with the panel manufacturer's printed instruction and details, or the approved shop drawings. Installation shall allow for expansion and contraction of flashing.

E. Fasteners: Fastener spacings shall be in accordance with the manufacturer's recommendations, and as necessary to withstand the design loads indicated. Install fasteners in valleys or crowns as recommended by the manufacturer of the sheet being used. Install fasteners in straight lines within a tolerance of 13 mm (1/2-inch) in the length of a bay. Drive exposed penetrating type fasteners normal to the surface, and to a uniform depth to seat gasketed washers properly, and drive so as not to damage factory applied coating. Exercise extreme care in drilling pilot holes for fastenings to keep drills perpendicular and centered in valleys, or crowns, as applicable. After drilling, remove metal filings and burrs from holes prior to installing fasteners and washers. Torque used in applying fasteners shall not exceed that recommended by the manufacturer. Remove panels deformed or otherwise damaged by over-torqued fastenings, and provide new panels. Remove metal shavings and filings from roofs on completion to prevent rusting and discoloration of the panels.

3.2 PROTECTION AND CLEANING

A. Protect panels and other components from damage during and after erection, and until project is accepted by the Government.

B. After completion of work, all exposed finished surfaces of panels shall be cleaned of soil, discoloration and disfiguration. Touch-up abraded surfaces of panels.

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SECTION 07 54 23
THERMOPLASTIC POLYOLEFIN (TPO) ROOFING

PART 1 GENERAL

1.1 DESCRIPTION

A. Adhered Thermoplastic Polyolefin (TPO) sheet membrane roofing system.

1.2 RELATED WORK

A. Treated wood framing, blocking, and nailers: Section 06 10 00, ROUGH CARPENTRY

B. Roof Insulation: Section 07 22 00, ROOF AND DECK INSULATION.

C. Sheet metal components and wind uplift requirements for roof-edge design: Section 07 60 00, FLASHING AND SHEET METAL.

D. Miscellaneous items: Section 07 71 00, ROOF SPECIALTIES.

1.3 APPLICABLE PUBLICATIONS

A. Publications listed below form a part of this specification to the extent referenced. Publications are referenced in the text by the basic designation only. Editions of applicable publications current on date of issue of bidding documents apply unless otherwise indicated.

B. American National Standards Institute/Single-Ply Roofing Institute (ANSI/SPRI):

ANSI/SPRI ES-1-03.....Wind Design Standard for Edge Systems Used with Low Slope Roofing Systems.

C. American Society of Civil Engineers/Structural Engineering Institute (ASCE/SEI):

ASCE/SEI-7-10.....Minimum Design Loads for Buildings and Other Structures

D. ASTM International (ASTM):

C1371-04.....Standard Test Method for Determination of Emittance of Materials Near Room Temperature Using Portable Emissometers

C1549-04.....Standard Test Method for Determination of Solar Reflectance Near Ambient Temperature Using a Portable Solar Reflectometer

D4263.....Standard Test Method for Indicating Moisture in Concrete by the Plastic Sheet Method

D4434-06.....Standard Specification for Poly (Vinyl Chloride) Sheet Roofing

D6878-08.....Standard Specification for Thermoplastic Polyolefin Based Sheet Roofing
E108-10.....Standard Test Methods for Fire Tests of Roof Coverings
E408-71(R2008).....Standard Test Methods for Total Normal Emittance of Surfaces Using Inspection-Meter Techniques
E1918-06.....Standard Test Method for Measuring Solar Reflectance of Horizontal and Low-Sloped Surfaces in the Field
E1980-01.....Standard Test Method for Measuring Solar Reflectance of Horizontal and Low-Sloped Surfaces in the Field

E. Cool Roof Rating Council:
CRRC-1.....Product Rating Program, www.coolroofs.org

F. FM Approvals: RoofNav Approved Roofing Assemblies and Products.
4450-89.....Approved Standard for Class 1 Insulated Steel Deck Roofs
4470-10.....Approved Standard for Class 1 Roof Coverings
1-28-09.....Loss Prevention Data Sheet: Design Wind Loads.
1-29-09.....Loss Prevention Data Sheet: Above-Deck Roof Components
1-49-09.....Loss Prevention Data Sheet: Perimeter Flashing

G. National Roofing Contractors Association: Roofing and Waterproofing Manual

H. U.S. Department of Energy (DoE): Roof Products Qualified Product List, www.energystar.gov

1.4 PERFORMANCE REQUIREMENTS

A. Material Compatibility: Provide roofing materials that are compatible with one another under conditions of service and application required, as demonstrated by membrane roofing manufacturer based on testing and field experience.

B. Roofing System Energy Performance Requirements: Provide a roofing system identical to components that that have been successfully tested by a qualified independent testing and inspecting agency to meet the following requirements:

1. Energy Performance, Energy Star: Provide roofing system that is listed on DOE's ENERGY STAR "Roof Products Qualified Product List" for low-slope roof products.

1.5 QUALITY CONTROL

A. Installer Qualifications:
   1. Licensed or approved in writing by manufacturer to perform work under warranty requirements of this Section.
   2. Employ full-time supervisors knowledgeable and experienced in roofing of similar types and scopes, and able to communicate with owner and workers.

B. Inspector Qualifications: Inspection of work by third-party technical inspector or technical representative of manufacturer experienced in the installation and maintenance of the specified roofing system, qualified to perform roofing observation and inspection specified in Field Quality Control Article, to determine Installer’s compliance with the requirements of this Project, and approved by the manufacturer to issue warranty certification. The Roofing Inspector shall be one of the following:
   1. An authorized full-time technical employee of the manufacturer, not engaged in the sale of products.
   2. An independent party certified as a Registered Roof Observer by the Roof Consultants Institute (RCI), retained by the Contractor or the Manufacturer and approved by the Manufacturer.

C. Product/Material Requirements:
   1. Obtain products from single manufacturer or from sources recommended by manufacturer for use with roofing system and incorporated in manufacturer's warranty.

D. Roofing system design standard requirements:
   1. Recommendations of FM Approvals 1-49 Loss Prevention Data Sheet for Perimeter Flashings.
   2. Recommendations of ANSI/SPRI ES-1 for roof edge design.
   3. Roofing System Design: Provide roofing system that is identical to systems that have been successfully tested by a qualified testing and inspecting agency to resist uplift pressure calculated according to ASCE/SEI 7, Basic Wind Velocity (based on location): 85 mph, Exposure Category: B, Height of Penthouse Roof (at eave): 60’, Height of Lower Roof (at eave): 42’, Importance Category: 1.15, Topographic Factor: 1, Enclosure Classification: 0.55.

      Penthouse Roof
      a. Corner Uplift Pressure: (-60.57 lb/sq. ft.).
      b. Perimeter Uplift Pressure: (-42.49 lb/sq. ft.).
      c. Field-of-Roof Uplift Pressure: (-28.02 lb/sq. ft.).

Lower Roof (3-story)

a. Corner Uplift Pressure: (-57.72 lb/sq. ft.)

b. Perimeter Uplift Pressure: (-40.49 lb/sq. ft.)

c. Field-of-Roof Uplift Pressure: (-26.70 lb/sq. ft.)

4. FM Approvals Listing: Provide roofing membrane, base flashing, and component materials that comply with requirements in FM Approvals 4450 and FM Approvals 4470 as part of a roofing system and that are listed in FM Approvals "RoofNav" for Class 1 or noncombustible construction, as applicable. Identify materials with FM Approvals markings.
   a. Fire/Windstorm Classification: Class 1A-75.
   b. Hail Resistance: MH.

E. Pre-Roofing Meeting:
   1. Upon completion of roof deck installation and prior to any roofing application, hold a pre-roofing meeting arranged by the Contractor and attended by the Roofing Inspector, Material Manufacturers Technical Representative, Roofing Applicator, Contractor, and Resident Engineer.
   2. Discuss specific expectations and responsibilities, construction procedures, specification requirements, application, environmental conditions, job and surface readiness, material storage, and protection.
   3. Inspect roof deck at this time to:
      a. Verify that work of other trades which penetrates roof deck is completed.
      b. Determine adequacy of deck anchorage, presence of foreign material, moisture and unlevel surfaces, or other conditions that would prevent application of roofing system from commencing or cause a roof failure.
      c. Examine samples and installation instructions of manufacturer.

1.6 SUBMITTALS

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, SAMPLES.

B. Product Data:
   1. Adhesive materials.
   2. Membrane sheet roofing and flashing membrane.
   3. Substrate and Deckboard.
   4. Roof walkway.
   5. Vapor retarder

6. Fastening requirements.
7. Application instructions.

C. Certificates:
1. Indicating materials and method of application of roofing system meets requirements of FM Approvals "RoofNav" for specified fire/windstorm classification.
2. Indicating compliance with energy performance requirement.

D. Warranty: As specified.

E. Documentation of supervisors' and inspectors' qualifications.

F. Field reports of roofing inspector.

G. Temporary protection plan. Include list of proposed temporary materials.

H. Contract Close-out Submittals:
1. Maintenance Manuals.
2. Warranty signed by installer and manufacturer.

1.7 DELIVERY, STORAGE AND HANDLING

A. Comply with the recommendations of the NRCA “Roofing and Waterproofing Manual” applicable to single ply membrane roofing for storage, handling and installation.

1.8 ENVIRONMENTAL REQUIREMENTS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit roofing system to be installed according to manufacturer's written instructions and warranty requirements.

B. Protection of interior spaces: Refer to Section 01 00 00, GENERAL REQUIREMENTS.

1.9 WARRANTY

Roofing work subject to the terms of the Article "Warranty of Construction," FAR clause 52.246-21, except extend the warranty period to 20 years.

PART 2 - PRODUCTS

2.1 TPO MEMBRANE ROOFING

A. Fabric-Reinforced Thermoplastic Polyolefin Sheet: ASTM D6878, internally fabric or scrim reinforced, 1.5 mm (60 mils) thick, with flexible fleece-back TPO sheet.
1. Color: White.

B. Basis-of-Design Product: Subject to compliance with requirements, available manufacturers offering comparable products to the following:

1. Carlisle SynTec Incorporated:
    a. Sure-Weld FleeceBACK Adhered Roofing System, with 115 membrane and complying with the additional requirements necessary for 20 year warranty.
2. Thickness: 60 mils, nominal

2.2 ACCESSORIES:

A. Sheet Flashing: Manufacturer's standard sheet flashing of same material, type, reinforcement, thickness, and color as TPO sheet membrane.

B. Bonding Adhesive: Manufacturer's standard, water based.

C. Metal Termination Bars: Manufacturer's standard, predrilled stainless-steel or aluminum bars, approximately 25 by 3 mm (1 by 1/8 inch) thick; with anchors.

D. Cover Board: ASTM C 1177/C 1177M, glass-mat water-resistant gypsum substrate, 1/4 inch thick.

1. Product: Subject to compliance with requirements, available products that me be incorporated into the Work, but not limited to, the following:
    a. Georgia-Pacific Corporation; Dens Deck.

E. Miscellaneous Accessories: Provide sealers, preformed flashings, preformed inside and outside corner sheet flashings, T-joint covers, lap sealants, and other accessories acceptable to manufacturer.

2.3 ADHESIVE AND SEALANT MATERIALS:

A. General: Adhesive and sealant materials recommended by roofing system manufacturer for intended use, identical to materials utilized in approved listed roofing system, and compatible with roofing membrane.

1. Liquid-type auxiliary materials shall comply with VOC limits of authorities having jurisdiction.
2. Adhesives and sealants that are not on the exterior side of weather barrier shall comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
    a. Plastic Foam Adhesives: 50 g/L.
    b. Gypsum Board and Panel Adhesives: 50 g/L.
    c. Multipurpose Construction Adhesives: 70 g/L.
    d. Fiberglass Adhesives: 80 g/L.
    e. Single-Ply Roof Membrane Adhesives: 250 g/L.
    f. Other Adhesives: 250 g/L.
    g. PVC Welding Compounds: 510 g/L.
    h. Adhesive Primer for Plastic: 650 g/L

i. Single-Ply Roof Membrane Sealants: 450 g/L.
j. Nonmembrane Roof Sealants: 300 g/L.
k. Sealant Primers for Nonporous Substrates: 250 g/L.
l. Sealant Primers for Porous Substrates: 775 g/L.

2.4 SUBSTRATE BOARD

A. Substrate board shall be mechanically fastened to all metal deck areas receiving new membrane roof.
1. Product: Subject to compliance with requirements, available products that me be incorporated into the Work, but not limited to, the following:
a. Georgia-Pacific Corporation; Dens Deck.

2.5 VAPOR RETARDER

A. Rubberized Asphalt Membrane: Carlisle 725 Air & Vapor Barrier:
1. Adhesive: Manufacturer’s standard adhesive; Sure-Seal Fast Adhesive.

2.6 ROOF WALKWAYS

A. Molded Walkway Pads or Walkway Rolls: Location as indicated on drawings.
1. Use fiber-reinforced sheet not less than 3 ft. wide and 60 mils thick.
1. Attachment shall be with splicing tape or splicing cement per manufacturer’s requirements.

PART 3 - EXECUTION

3.1 EXAMINATION:

A. Examine substrates and conditions with roofing Installer and roofing inspector to verify compliance with project requirements and suitability to accept subsequent roofing work. Correct unsatisfactory conditions before proceeding with roofing work.
B. Do not apply roofing if roof surface will be used for subsequent work platform, storage of materials, or staging or scaffolding will be erected thereon unless system is protected.

3.2 PREPARATION

A. Complete roof deck construction prior to commencing roofing work:
1. Install curbs, blocking, edge strips, nailers, cants, and other components where insulation, roofing, and base flashing is attached to, in place ready to receive insulation and roofing.

2. Complete deck and insulation to provide designed drainage to working roof drains.
3. Document installation of related materials to be concealed prior to installing roofing work.

B. Dry out surfaces, including the flutes of metal deck that become wet from any cause during progress of the work before roofing work is resumed. Apply materials to dry substrates.
C. Sweep decks to broom clean condition. Remove all dust, dirt or debris.
D. Remove projections that might damage materials.
E. Concrete Decks:
1. Test concrete decks for moisture prior to application of roofing materials. Test for capillary moisture by plastic sheet method according to ASTM D4263.
2. Prime concrete decks with primer as specified.
3. Allow primer to dry before application of adhesive.

3.3 TEMPORARY PROTECTION

A. Install temporary protection at the end of day's work and when work is halted for an indefinite period or work is stopped when precipitation is imminent. Comply with approved temporary protection plan.
B. Install temporary cap flashing over the top of base flashings where permanent flashings are not in place to provide protection against moisture entering the roof system through or behind the base flashing. Securely anchor in place to prevent blow off and damage by construction activities.
C. Provide for removal of water or drainage of water away from the work.
D. Provide temporary protection over installed roofing by means of duckboard walkways, plywood platforms, or other materials, as approved by Resident Engineer, for roof areas that are to remain intact, and that are subject to foot traffic and damage. Provide notches in sleepers to permit free drainage.

3.4 INSTALLATION, GENERAL

A. FM Approvals Installation Standard: Install roofing membrane, base flashings, wood cants, blocking, curbs, and nailers, and component materials in compliance with requirements in FMG 4450 and FMG 4470 as part of a membrane roofing system as listed in FM Approval's "RoofNav" for fire/windstorm classification indicated. Comply with recommendations in FM Approvals' Loss Prevention Data Sheet 1-49, including requirements for wood nailers and cants.

B. NRCA Installation Standard: Install roofing system in accordance with applicable NRCA Manual Plates and NRCA recommendations.
C. Manufacturer Recommendations: Comply with roofing system manufacturer's written installation recommendations.
D. Coordination with related work: Coordinate roof operations with roof insulation and sheet metal work so that insulation and flashings are installed concurrently to permit continuous roofing operations.
E. Installation Conditions:
   1. Apply dry roofing materials. Apply roofing work over dry substrates and materials.
   2. Apply materials within temperature range and surface and ambient conditions recommended by manufacturer.
   3. Except for temporary protection, do not apply materials during damp or rainy weather, during excessive wind conditions, nor while moisture (dew, snow, ice, fog or frost) is present in any amount in or on the materials to be covered or installed:
      a. Do not apply materials when the temperature is below 4 deg. C (40 deg. F).
      b. Do not apply materials to substrate having temperature of 4 deg. C (40 deg. F) or less.

3.5 INSTALLATION OF TPO ROOFING

A. Do not allow the membrane to come in contact with surfaces contaminated with asphalt, coal tar, oil, grease, or other substances which are not compatible with TPO.
B. Install the membrane so the sheets run perpendicular to the long dimension of the insulation boards.
C. Commence installation at the low point of the roof and work towards the high point. Lap the sheets so the flow of water is not against the edges of the sheet.
D. Position the membrane so it is free of buckles and wrinkles.
E. Roll sheet out on deck; inspect for defects as being rolled out and remove defective areas. Allow for relaxing before proceeding.
   1. Lap edges and ends of sheets 51 mm (two inches) or more as recommended by the manufacturer.
   2. Heat weld laps. Apply pressure as required. Seam strength of laps as required by ASTM D4434.
   3. Check seams to ensure continuous adhesion and correct defects.
   4. Finish edges of laps with a continuous beveled bead of sealant to sheet edges to provide smooth transition.
   5. Finish seams as the membrane is being installed (same day).

6. Anchor perimeter to deck or wall as specified.

F. Repair areas of welded seams where samples have been taken or marginal welds, bond voids, or skips occurs.

G. Repair fishmouths and wrinkles by cutting to lay flat and installing patch over cut area extending 102 mm (four-inches) beyond cut.

H. Membrane Perimeter Anchorage:

1. Install metal fastening strip at the perimeter of each roof level, curb flashing, expansion joints and similar penetrations as indicated and in accordance with membrane manufacturer's instructions on top of roof membrane to deck or wall.

2. Mechanically Fastened Metal Fastening Strip:

a. Set top of mechanical fastener set flush with top surface of the metal fastening strip. Space mechanical fasteners a maximum 305 mm (12 inches) on center starting 25 mm (one inch) from the end of the nailing strip.

b. When strips are cut round corners and eliminate sharp corners.

c. After mechanically fastening strip cover and seal strip with a six-inch wide roof membrane strip; heat weld to roof membrane and seal edges.

d. At parapet walls, intersecting building walls and curbs, secure the membrane to the structural deck with fasteners 305 mm (12 inches) on centers or as shown on NRCA manual.

3.6 INSTALLATION OF FLASHING

A. Install flashings as the membrane is being installed. If the flashing can not be completely installed in one day, complete the installation until the flashing is in a watertight condition and provide temporary covers or seals.

B. Flashing Roof Drains:

1. Install roof drain flashing as recommended by the membrane manufacturer, generally as follows:

a. Coordinate to set the metal drain flashing in asphalt roof cement, holding cement back from the edge of the metal flange.

b. Do not allow the roof cement to come in contact with the TPO roof membrane.

c. Adhere the TPO roof membrane to the metal flashing with the membrane manufacturer's recommended adhesive.

2. Turn down the metal drain flashing and TPO roof membrane into the drain body and install clamping ring and strainer.

C. Installing TPO Base Flashing and Pipe Flashing:
   1. Install TPO flashing membranes to pipes, wall or curbs to a height not less than 203 mm (eight inches) above roof surfaces and 102 mm (four inches) on roof membrane.
      a. Adhere flashing to pipe, wall or curb with adhesive.
      b. Form inside and outside corners of TPO flashing membrane in accordance with NRCA manual. Form pipe flashing in accordance with NRCA manual use pipe boot.
      c. Lap ends not less than 102 mm (four inches).
      d. Heat weld flashing membranes together and flashing membranes to roof membranes. Finish exposed edges with sealant as specified.
      e. Install flashing membranes in accordance with NRCA manual.
   2. Anchor top of flashing to walls or curbs with fasteners spaced not over 203 mm (eight inches) on centers. Use fastening strip on ducts. Use pipe clamps on pipes or other round penetrations.
   3. Apply sealant to top edge of flashing.

E. Repairs to membrane and flashings:
   1. Remove sections of TPO sheet roofing or flashing that is creased wrinkled or fishmouthed.
   2. Cover removed areas, cuts and damaged areas with a patch extending 102 mm (four inches) beyond damaged, cut, or removed area. Heat weld to roof membrane or flashing. Finish edge of lap with sealant as specified.

3.7 FIELD QUALITY CONTROL:

A. Final Roof Inspection: Arrange for roofing system manufacturer's technical personnel to inspect roofing installation on completion.
   1. Notify Architect and Owner 48 hours in advance of date and time of inspection.

B. Repair or remove and replace components of roofing work where test results or inspections indicate that they do not comply with specified requirements.
   1. Additional testing and inspecting, at Contractor's expense, will be performed to determine if replaced or additional work complies with specified requirements.

3.8 PROTECTING AND CLEANING

A. Protect membrane roofing system from damage and wear during remainder of construction period.

B. Correct deficiencies in or remove membrane roofing system that does not comply with requirements; repair substrates; and repair or reinstall

membrane roofing system to a condition free of damage and deterioration at time of acceptance by Owner.

C. Clean overspray and spillage from adjacent construction. Clean membrane and restore surface to like-new condition meeting solar reflectance requirements.

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SECTION 07 60 00
FLASHING AND SHEET METAL

PART 1 - GENERAL

1.1 DESCRIPTION

Formed sheet metal work for wall and roof flashing, copings and drainage specialties, are specified in this section.

1.2 RELATED WORK

A. Membrane base flashings and stripping: Section 07 54 23, THERMOPLASTIC POLYOLEFIN (TPO) ROOFING.

B. Joint Sealants: Section 07 92 00, JOINT SEALANTS.

C. Integral flashing components of manufactured roof specialties and accessories or equipment: Section 07 71 00, ROOF SPECIALTIES, Division 22, PLUMBING sections and Division 23 HVAC sections.

D. Expansion joints: Section 07 95 13 EXPANSION JOINT COVER ASSEMBLIES.

E. Flashing of Roof Drains: Section 22 14 00, FACILITY STORM DRAINAGE.

1.3 APPLICABLE PUBLICATIONS

A. Publications listed below form a part of this specification to the extent referenced. Publications are referenced in the text by the basic designation only. Editions of applicable publications current on date of issue of bidding documents apply unless otherwise indicated.

B. American National Standards Institute/Single-Ply Roofing Institute (ANSI/SPRI):

ANSI/SPRI ES-1-03.....Wind Design Standard for Edge Systems Used with Low Slope Roofing Systems

C. American Architectural Manufacturers Association (AAMA):

AAMA 620.....Voluntary Specification for High Performance Organic Coatings on Coil Coated Architectural Aluminum

AAMA 621.....Voluntary Specification for High Performance Organic Coatings on Coil Coated Architectural Hot Dipped Galvanized (HDG) and Zinc-Aluminum Coated Steel Substrates

D. ASTM International (ASTM):

A653/A653M-09.....Steel Sheet Zinc-Coated (Galvanized) or Zinc Alloy Coated (Galvanized) by the Hot- Dip Process
B209-07.....Aluminum and Aluminum-Alloy Sheet and Plate
D1187-97(R2002).....Asphalt Base Emulsions for Use as Protective Coatings for Metal
D4586-07.....Asphalt Roof Cement, Asbestos Free

E. Sheet Metal and Air Conditioning Contractors National Association (SMACNA): Architectural Sheet Metal Manual.
F. National Association of Architectural Metal Manufacturers (NAAMM):
AMP 500-06.....Metal Finishes Manual
G. Federal Specification (Fed. Spec):
A-A-1925A.....Shield, Expansion; (Nail Anchors)
H. International Code Commission (ICC): International Building Code, Current Edition

1.4 PERFORMANCE REQUIREMENTS

A. Wind Uplift Forces: Resist the following forces per FM Approvals 1-49:
1. Wind Zone 1: 0.48 to 0.96 kPa (10 to 20 lbf/sq. ft.): 1.92-kPa (40-lbf/sq. ft.) perimeter uplift force, 2.87-kPa (60-lbf/sq. ft.) corner uplift force, and 0.96-kPa (20-lbf/sq. ft.) outward force.
2. Wind Zone 1: 1.00 to 1.44 kPa (21 to 30 lbf/sq. ft.): 2.87-kPa (60-lbf/sq. ft.) perimeter uplift force, 4.31-kPa (90-lbf/sq. ft.) corner uplift force, and 1.44-kPa (30-lbf/sq. ft.) outward force.
3. Wind Zone 2: 1.48 to 2.15 kPa (31 to 45 lbf/sq. ft.): 4.31-kPa (90-lbf/sq. ft.) perimeter uplift force, 5.74-kPa (120-lbf/sq. ft.) corner uplift force, and 2.15-kPa (45-lbf/sq. ft.) outward force.
4. Wind Zone 3: 2.20 to 4.98 kPa (46 to 104 lbf/sq. ft.): 9.96-kPa (208-lbf/sq. ft.) perimeter uplift force, 14.94-kPa (312-lbf/sq. ft.) corner uplift force, and 4.98-kPa (104-lbf/sq. ft.) outward force.

B. Wind Design Standard: Fabricate and install copings tested per ANSI/SPRI ES-1 to resist design pressure indicated on Drawings.

1.5 SUBMITTALS

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
B. Shop Drawings: For all specified items, including:
1. Flashings

2. Copings

C. Manufacturer's Literature and Data: For all specified items, including:
   1. Thru wall flashing
   2. Nonreinforced, elastomeric sheeting

D. Colors:
   1. Manufacturer’s fluorocarbon finish, as specified in Section 09 06 00 SCHEDULE OF FINISHES. Submit samples to architect for final color approval.

PART 2 - PRODUCTS

2.1 FLASHING AND SHEET METAL MATERIALS

A. Stainless Steel: ASTM A167, Type 302B, dead soft temper.

B. Aluminum Sheet: ASTM B209, alloy 3003-H14.

C. Galvanized Sheet: ASTM, A653.

D. Nonreinforced, Elastomeric Sheeting: Elastomeric substances reduced to thermoplastic state and extruded into continuous homogenous sheet (0.056 inch) thick. Sheeting shall have not less than 7 MPa (1,000 psi) tensile strength and not more than seven percent tension-set at 50 percent elongation when tested in accordance with ASTM D412. Sheeting shall show no cracking or flaking when bent through 180 degrees over a 1 mm (1/32 inch) diameter mandrel and then bent at same point over same size mandrel in opposite direction through 360 degrees at temperature of -30°C (-20 °F).

2.2 FLASHING ACCESSORIES

A. Fasteners:
   1. Use stainless steel for stainless steel and aluminum alloy. Use galvanized steel or stainless steel for galvanized steel.
   2. Nails:
      a. Minimum diameter for aluminum nails 3 mm (0.105 inch).
      b. Minimum diameter for stainless steel nails: 2 mm (0.095 inch) and annular threaded.
      c. Length to provide not less than 22 mm (7/8 inch) penetration into anchorage.
   3. Rivets: Not less than 3 mm (1/8 inch) diameter.
   4. Expansion Shields: Fed Spec A-A-1925A.

B. Sealant: As specified in Section 07 92 00, JOINT SEALANTS for exterior locations.

C. Insect Screening: ASTM D3656, 18 by 18 regular mesh.

D. Roof Cement: ASTM D4586.

2.3 SHEET METAL THICKNESS

A. Except as otherwise shown or specified use thickness or weight of sheet metal as follows:

1. Thickness of aluminum or galvanized steel as specified with each item.

2.4 FABRICATION, GENERAL

A. Jointing:

1. Joints shall conform to following requirements:
   a. Flat-lock joints shall finish not less than 19 mm (3/4 inch) wide.
   b. Lap joints subject to stress shall finish not less than 25 mm (one inch) wide and shall be soldered and riveted.
   c. Unsoldered lap joints shall finish not less than 102 mm (4 inches) wide.

B. Expansion and Contraction Joints:

1. Fabricate in accordance with the Architectural Sheet Metal Manual recommendations for expansion and contraction of sheet metal work in continuous runs.
2. Space joints as shown or as specified.
3. Space expansion and contraction joints for aluminum at intervals not exceeding 5486 mm (18 feet).
4. Fabricate slip-type or loose locked joints and fill with sealant unless otherwise specified.
5. Fabricate joint covers of same thickness material as sheet metal served.

C. Cleats:

1. Fabricate cleats to secure flashings and sheet metal work over 305 mm (12 inches) wide and where specified.
2. Provide cleats for maximum spacing of 305 mm (12 inch) centers unless specified otherwise.
3. Form cleats of same metal and weights or thickness as the sheet metal being installed unless specified otherwise.
4. Fabricate cleats from 51 mm (2 inch) wide strip. Form end with not less than 19 mm (3/4 inch) wide loose lock to item for anchorage.

Form other end of length to receive nails free of item to be anchored and end edge to be folded over and cover nail heads.

D. Edge Strips or Continuous Cleats:
   1. Fabricate continuous edge strips where shown and specified to secure loose edges of the sheet metal work.
   2. Except as otherwise specified, fabricate edge strips a minimum 24 gauge galvanized sheet steel.
   3. Use material compatible with sheet metal to be secured by the edge strip.
   4. Fabricate in 3048 mm (10 feet) maximum lengths with not less than 19 mm (3/4 inch) loose lock into metal secured by edge strip.

E. Drips:
   1. Form drips at lower edge of sheet metal counter-flashings, cap flashings, wall copings, by folding edge back 13 mm (1/2 inch) and bending out 45 degrees from vertical to carry water away from the wall.
   2. Form drip to provide hook to engage cleat or edge strip for fastening for not less than 19 mm (3/4 inch) loose lock where shown.

F. Edges:
   1. Edges of flashings concealed in masonry joints opposite drain side shall be turned up 6 mm (1/4 inch) to form dam, unless otherwise specified or shown otherwise.
   2. Finish exposed edges of flashing with a 6 mm (1/4 inch) hem formed by folding edge of flashing back on itself when not hooked to edge strip or cleat. Use 6 mm (1/4 inch) minimum penetration beyond wall face with drip for through-wall flashing exposed edge.

G. Metal Options:
   1. Stainless steel may be used in concealed locations for fasteners of other metals exposed to view.

2.5 FINISHES

A. Use same finish on adjacent metal or components and exposed metal surfaces unless specified or shown otherwise.

B. In accordance with NAAMM Metal Finishes Manual AMP 500, unless otherwise specified.

C. Finish exposed metal surfaces as follows, unless specified otherwise:
   1. Aluminum:

a. Fluorocarbon Finish: AAMA 620, high performance organic coating. Match existing colors of existing building. Submit samples to architect for final approval.

2. Galvanized Steel:

a. Manufacturer's finish:

1. Fluorocarbon Finish: AAMA 621, high performance organic coating. Match existing colors of existing building. Submit samples to architect for final approval.

2.6 THROUGH-WALL FLASHINGS

A. Form through-wall flashing to provide a mechanical bond or key against lateral movement in all directions. Install a sheet having 2 mm (1/16 inch) deep transverse channels spaced four to every 25 mm (one inch), or ribbed diagonal pattern, or having other deformation unless specified otherwise.

1. Fabricate in not less than 2438 mm (8 feet) lengths; 3048 mm (10 feet) maximum lengths.
2. Fabricate so keying nests at overlaps.

B. For Masonry Work When Concealed Except for Drip:

1. Galvanized steel, 22 ga.
2. Turn up wall at back edge as shown.
3. Form exposed portions of flashing with drip, approximately 6 mm (1/4 inch) projection beyond wall face.

C. For Masonry Work When Exposed Edge Forms a Receiver for Counter Flashing:

1. Use same metal and thickness as counter flashing.
2. Turn up wall at back edge as shown.
3. Form exposed portion as snap lock receiver for counter flashing upper edge.

D. For Flashing at Architectural Precast Concrete or Cast Stone Panels.

1. Use plan flat sheet of stainless steel.
2. Form exposed portions with drip as specified or receiver.

E. Window Sill Flashing and Lintel Flashing:

1. Use galvanized steel.
2. Fabricate flashing at ends with folded corners to turn up 5 mm (3/16 inch) in first vertical masonry joint beyond masonry opening.
3. Turn up back edge as shown.
4. Form exposed portion with drip as specified or receiver.

F. Door Sill Flashing:

1. Where concealed, use galvanized steel.
2. Where shown on drawings as combined counter flashing under threshold, sill plate, door sill, or where subject to foot traffic, use either 0.6 Kg (24 ounce) copper, 0.6 mm (0.024 inch) stainless steel, or 0.6 mm (0.024 inch) thick stainless steel.
3. Fabricate flashing at ends to turn up 5 mm (3/16 inch) in first vertical masonry joint beyond masonry opening with folded corners.

2.7 COPINGS

1. Fabricate of galvanized sheet steel not less than 24 gauge.
2. Turn outer edges down each face of wall as shown.
3. Maximum lengths of 3048 mm (10 feet).
4. Shop fabricate external and internal corners as one piece assemblies with not less than 305 mm (12 inch) leg lengths.
5. Copings shall be Category 5 FM rated
6. Provide 102 mm (four inch) wide 0.8 mm (0.032 inch) thick watertight joint covers.
7. Finish: Fluorocarbon.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General:

1. Install flashing and sheet metal items as shown in Sheet Metal and Air Conditioning Contractors National Association, Inc., publication, ARCHITECTURAL SHEET METAL MANUAL, except as otherwise shown or specified.
2. Apply Sealant as specified in Section 07 92 00, JOINT SEALANTS.
3. Apply sheet metal and other flashing material to surfaces which are smooth, sound, clean, dry and free from defects that might affect the application.
4. Remove projections which would puncture the materials and fill holes and depressions with material compatible with the substrate. Cover holes or cracks in wood wider than 6 mm (1/4 inch) with sheet metal compatible with the roofing and flashing material used.
5. Coordinate with masonry work for the application of a skim coat of mortar to surfaces of unit masonry to receive flashing material before the application of flashing.

6. Confine direct nailing of sheet metal to strips 305 mm (12 inch) or less wide. Nail flashing along one edge only. Space nail not over 102 mm (4 inches) on center unless specified otherwise.
7. Install bolts, rivets, and screws where indicated, specified, or required in accordance with the SMACNA Sheet Metal Manual. Space rivets at 75 mm (3 inch) on centers in two rows in a staggered position. Use neoprene washers under fastener heads when fastener head is exposed.
8. Coordinate with roofing work for the installation of metal base flashings and other metal items having roof flanges for anchorage and watertight installation.
9. Nail continuous cleats on 75 mm (3 inch) on centers in two rows in a staggered position.
10. Nail individual cleats with two nails and bend end tab over nail heads. Lock other end of cleat into hemmed edge.
11. Install flashings in conjunction with other trades so that flashings are inserted in other materials and joined together to provide a water tight installation.

3.2 THROUGH-WALL FLASHING

A. General:

1. Install continuous through-wall flashing between top of concrete foundation walls and bottom of masonry veneer; at top of concrete floors; and elsewhere as shown.
2. Where exposed portions are used as a counterflashings, lap base flashings at least 102 mm (4 inches)and use thickness of metal as specified for exposed locations.
3. Exposed edge of flashing may be formed as a receiver for two piece counter flashing as specified.
4. Terminate exterior edge beyond face of wall approximately 6 mm (1/4 inch) with drip edge where not part of counter flashing.
5. Lap end joints at least two corrugations, but not less than 102 mm (4 inches). Seal laps with sealant.
6. Coordinate with other work to set in a bed of mortar above and below flashing so that total thickness of the two layers of mortar and flashing are same as a regular mortar joint.

7. Where ends of flashing terminate turn ends up 25 mm (1 inch) and fold corners to form dam extending to wall face in vertical mortar or veneer joint.
8. Turn flashing up not less than 203 mm (8 inch) between masonry or behind exterior veneer.

B. Flashing at Veneer Walls:
1. Install near line of finish floors over shelf angles or where shown.
2. Turn up against and fasten through sheathing and into each stud.
3. At stud framing, hem top edge 19 mm (3/4 inch) and secure to each stud with stainless steel fasteners through sheathing.
4. At concrete backing, extend flashing into reglet as specified.
5. Coordinate with installation of weather barrier felt for lap over top of flashing.

C. Lintel Flashing when not part of shelf angle flashing:
1. Install flashing full length of lintel to nearest vertical joint in masonry over veneer.
2. Turn ends up 25 mm (one inch) and fold corners to form dam and extend end to face of wall.
3. Turn back edge up along outside face of sheathing and continue up not less than 203 mm (8 inches); terminate back edge as specified for back-up wall.

D. Window Sill Flashing:
1. Install flashing to extend not less than 102 mm (4 inch) beyond ends of sill into vertical joint of masonry or veneer.
2. Turn back edge up to terminate under window frame.
3. Turn ends up 25 mm (one inch) and fold corners to form dam and extend to face of wall.

E. Door Sill Flashing:
1. Install flashing under bottom of plate sills of doors over curbs opening onto roofs. Extend flashing out to form counter flashing or receiver for counter flashing over base flashing. Set in sealant.
2. Extend sill flashing 203 mm (8 inch) beyond jamb opening. Turn ends up one inch in vertical masonry joint, extend end to face of wall. Join to counter flashing for water tight joint.
3. Where doors thresholds cover over waterproof membranes install sill flashing over water proof membrane under thresholds. Extend beyond opening to cover exposed portion of waterproof membrane and not less

than 152 mm (6 inch) beyond door jamb opening at ends. Turn up approximately 6 mm (1/4 inch) under threshold.

3.3 COPINGS

A. General:

1. Install ends adjoining existing construction so as to form space for installation of sealants. Sealant is specified in Section 07 92 00, JOINT SEALANTS.

B. Galvanized Sheet Steel Coping:

1. Install with 6 mm (1/4 inch) joint between ends of coping sections.
2. Install joint covers, centered at each joint, and securely lock in place.

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SECTION 07 71 00
ROOF SPECIALTIES

PART 1 - GENERAL

1.1 DESCRIPTION

This section specifies roof scuttles and equipment supports.

1.2 RELATED WORK

A. Color and texture of finish: Section 09 06 00, SCHEDULE FOR FINISHES. Sealant material and installation: Section 07 92 00, JOINT SEALANTS.

B. General insulation: Rigid insulations for roofing: Section 07 22 00, ROOF AND DECK INSULATION and Section 07 54 23 THERMOPLASTIC POLOLEFIN (TPO) ROOFING.

1.3 QUALITY CONTROL

A. All roof accessories shall be the products of manufacturers regularly engaged in producing the kinds of products specified.

B. Each accessory type shall be the same and be made by the same manufacturer.

C. Each accessory shall be completely assembled to the greatest extent possible before delivery to the site.

1.4 SUBMITTALS

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Shop Drawings: Each item specified showing design, details of construction, installation and fastenings.

C. Manufacturer's Literature and Data: Each item specified.

1.5 APPLICABLE PUBLICATIONS

A. The publications listed below form a part of this specification to the extend referenced. The publications are referenced in the text by the basic designation only.

B. American Society for Testing and Material (ASTM):

A653/A653M-02.....Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) By the Hot-Dip Process

C612-00.....Mineral Fiber Block and Board Thermal Insulation

C. National Association of Architectural Metal Manufacturers (NAAMM):

AMP 500 Series.....Metal Finishes Manual

D. American Architectural Manufacturers Association (AAMA):

605-98.....High Performance Organic Coatings on Architectural Extrusions and Panels.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Galvanized Sheet Steel: ASTM A526/A526M; G-90 coating.

B. Roll-formed 12 gauge galvanized steel; G-90 coating.

C. Injection molded high-density polypropylene with UV-inhibitors.

2.2 ROOF HATCH (SCUTTLE)

A. Fabricate from G-90 paint bond galvanized steel.

B. Curb and Cover:

1. Exterior facing: 14 gauge (2mm) thick steel.
2. Interior facing: 22 gauge thick steel.
3. Minimum of 25 mm (one inch) thick mineral fiber insulation between facings of cover and over exterior face of curb.
4. Exterior curb with cap flashing: 14 gauge thick steel (corners to be fully welded) and 1″ thick rigid insulation.
5. Make curb 30 inches in height.
6. Form cover to lap curb and cap flashing.
7. Size opening as shown.

C. Hardware:

1. Provide spring snap latch with inside and outside operating handles and padlock hasp on inside. Provide two snap latches when hinge side is over 2100 mm (7 feet) long.
2. Provide pintle hinges.
3. Provide automatic hold open and operating arm with enclosed torsion or compression spring lifting mechanism.
4. Covers shall automatically lock in the open position at not less than 70 degrees.
5. Provide weatherstripping at cover closure.
6. Galvanize all hardware items.

D. Assembly:

1. Completely shop assemble roof scuttle.
2. Fully weld all joints exposed to the weather and built into the roofing.
3. Finish weld smooth where exposed.
4. Operation with minimum force to open and close.

E. Basis-of-Design:

1. Bilco; Type D Roof Hatch.

2.3 EQUIPMENT SUPPORTS

A. Fabricate equipment supports from 12 gauge thick galvanized steel with high density polypropylene base.
B. Strut shall be 1-5/8″ or 1-7/8″ as required by load.
C. Use 2-1/2″ galvanized steel bolts with ½″ nut at legs and 3″ galvanized steel bolts with ½″ nut at horizontal cross bracing.
D. Neoprene Isolation pad
E. Use uplift bar for Seismic and High-Wind areas. As specified by structural engineer.
F. Basis-of-Design:
   1. PHP Systems/Design; PHP - D.
G. Make size of supports suit size of equipment furnished, with height as shown on drawings, but not less than 200 mm (8 inches) above roof surface.

2.4 FINISH

A. Alkyd base red oxide primer. Field painted as specified in Section 09 06 00 SCHEDULE OF FINISHES.
B. Hot Dip Galvanize per ASTM A 123.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install roof specialties where shown.
B. Secure with fasteners in accordance with manufacture's printed installation instructions and approved shop drawings unless shown otherwise.
C. Coordinate to install insulation where shown; see Section 07 21 13, THERMAL INSULATION and Section 07 22 00, ROOF AND DECK INSULATION.
D. Comply with section 07 92 00, JOINT SEALANTS to install sealants where manufactures installation instructions require sealant, and Section 07 54 23 THERMOPLASTIC POLOLEFIN (TPO) ROOFING.
E. Coordinate with roofing work for installation of items in sequence to prevent water infiltration.
   a. After completion of base flashing bend down cap flashing flange and secure to blocking with screws.
   b. Install cover plates with formed aluminum flashing concealed and centered on joint. Flashing to lap cover not less than 100 mm (4 inches).
F. Equipment Supports: Do not anchor to roof.

3.2 PROTECTION OF ALUMINUM

A. Provide protection for aluminum against galvanic action wherever dissimilar materials are in contact, by painting the contact surfaces of

the dissimilar material with two coats of asphalt coating (complete coverage), or by separating the contact surfaces with a preformed neoprene tape having pressure sensitive adhesive coating on side.

B. Paint aluminum in contact with wood, concrete and masonry, or other absorptive materials, that may become repeatedly wet, with two coats of asphalt coating.

3.3 ADJUSTING

A. Adjust roof hatch hardware to operate freely and so that cover will operate without binding, close tightly at perimeter, and latch securely.

3.4 PROTECTION

Protect roof accessories from damage during installation and after completion of the work from subsequent construction.

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SECTION 07 81 00
APPLIED FIREPROOFING

PART 1 - GENERAL

1.1 DESCRIPTION

This section specifies spray applied mineral fiber and cementitious coverings to provide fire resistance to interior structural steel members shown.

1.2 SUBMITTALS

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Manufacturer's Literature and Data:

1. Manufacturer's complete and detailed application instructions and specifications.
2. Manufacturer's repair and patching instructions.

C. Certificates:

1. Certificate from testing laboratory attesting fireproofing material and application method meet the specified fire ratings.
   a. List thickness and density of material required to meet fire ratings.
   b. Accompanied by complete test report and test record.
2. Manufacturer's certificate indicating sprayed-on fireproofing material supplied under the Contract is same within manufacturing tolerance as fireproofing material tested.

D. Miscellaneous:

1. Manufacturer's written approval of surfaces to receive sprayed-on fireproofing.
2. Manufacturer's written approval of completed installation.
3. Manufacturer's written approval of the applicators of fireproofing material.

1.3 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Deliver to job-site in sealed containers marked and labeled to show manufacturer's name and brand and certification of compliance with the specified requirements.

B. Remove damaged containers from the site.

C. Store the materials off the ground, under cover, away from damp surfaces.

D. Keep dry until ready for use.

E. Remove materials that have been exposed to water before installation from the site.

1.4 QUALITY CONTROL

A. Preinstallation Conference: General Contractor shall conduct a preinstallation conference at the Project Site. B. Manufacturer's inspection and approval of surfaces to receive fireproofing as specified under paragraph Examination.

B. Manufacturer's approval of fireproofing applications.

C. Manufacturer's approval of completed installation.

D. Installer Qualifications: A firm or individual certified by manufacturer as sufficiently trained and experienced to install manufacturer’s products according to specified requirements.

E. Pre-Application Test Area:

1. Apply a test area consisting of a typical overhead fireproofing installation, including not less than 4.5 m (15 feet) of beam and deck.
   a. Apply to one column.
   b. Apply for the hourly ratings used.
2. Install in location selected by the Resident Engineer, for approval by the representative of the fireproofing material manufacturer and by the Government.
3. Perform Bond test on painted steel, if applicable, in accordance with ASTM E736.
4. Do not proceed in other areas until installation of test area has been completed and approved.
5. Keep approved installation area open for observation as criteria for sprayed-on fireproofing.

1.5 APPLICABLE PUBLICATIONS

A. Publications listed below form a part of this specification to the extent referenced. Publications are referenced in the text by the basic designation only.

B. American Society for Testing and Materials (ASTM):

E605-93 (R2006).....Thickness and Density of Sprayed Fire-Resistive Materials Applied to Structural Members

E736-00.....Cohesion/Adhesion of Sprayed Fire-Resistive Materials Applied to Structural Members

E759-92 (R2005).....The Effect of Deflection on Sprayed Fire-Resistive Material Applied to Structural Members

E760-92 (R2005).....Impact on Bonding of Sprayed Fire-Resistive Material Applied to Structural Members

E761-92 (R2005).....Compressive Strength of Fire-Resistive Material Applied to Structural Members

E859-93 (R2006).....Air Erosion of Sprayed Fire-Resistive Materials Applied to Structural Members

E937-93 (R2005).....Corrosion of Steel by Sprayed Fire-Resistive Material Applied to Structural Members

.

G21-96 (R2002).....Determining Resistance of Synthetic Polymeric Materials to Fungi

C. Underwriters Laboratories, Inc. (UL):

Fire Resistance Directory...Latest Edition including Supplements

D. Warnock Hersey (WH):

Certification Listings..Latest Edition

E. Factory Mutual System (FM):

Approval Guide.....Latest Edition including Supplements

PART 2 - PRODUCTS

2.1 SPRAYED-ON FIREPROOFING

A. ASTM E1042, Class (a), Category A.

1. Type I, factory mixed cementitious materials with approved aggregate.
2. Type II, factory mixed mineral fiber with integral inorganic binders minimum 240 kg/m^3 (15 1b/ft^3) density per ASTM E605 test unless specified otherwise. Use in areas that are completely encased.

B. Materials containing asbestos are not permitted.

C. Fireproofing characteristics when applied in the thickness and density required to achieve the fire-rating specified.

	Characteristic	Test	Results
1.	Deflection	ASTM E759	No cracking, spalling, or delamination when backing to which it is applied has a deflection up to 1/120 in 3m (10 ft.)
2.	Corrosion-Resistance	ASTM E937	No promotion of corrosion of steel.

3.	Bond Impact	ASTM E760	No cracking, spalling, or delamination.
4.	Cohesion/Adhesion (Bond Strength)	ASTM E736	Minimum cohesive/adhesive strength of 9.57 kPa (200 lbf/ft^2) for protected areas. 19.15 kPa (400 lbf/ft^2) for exposed areas.
5.	Air Erosion	ASTM E859	Maximum gain weight of the collecting filter 0.27gm/m^2 (0.025 gm/ft^2).
6.	Compressive Strength	ASTM E761	Minimum compressive strength 36 kPa (5 lbf/in^2).
7.	Surface Burning Characteristics with adhesive and sealer to be used	ASTM E84	Flame spread 25 or less smoke developed 50 or less
8.	Fungi Resistance	ASTM G21	Resistance to mold growth when inoculated with aspergillus niger (28 days for general application)

2.2 ADHESIVE

A. Bonding adhesive for Type II (fibrous) materials as recommended and supplied by the fireproofing material manufacturer.

B. Adhesive may be an integral part of the material or applied separately to surface receiving fireproofing material.

2.3 SEALER

A. Sealer for Type II (fibrous) material as recommended and supplied by the fireproofing material manufacturer.

B. Surface burning characteristics as specified for fireproofing material.

C. Fungus resistant.

D. Sealer may be an integral part of the material or applied separately to the exposed surface. When applied separately use contrasting color pigmented sealer, white preferred.

2.4 WATER

A. Clean, fresh, and free from organic and mineral impurities.

B. pH of 6.9 to 7.1.

2.5 MECHANICAL BOND MATERIAL

A. Expanded Metal Lath: ASTM C847, minimum weight of 0.92 kg/m^2 (1.7 pounds per square yard).

B. Fasteners: ASTM C841.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify surfaces to receive fireproofing are clean and free of dust, soot, oil, grease, water soluble materials or any foreign substance which would prevent adhesion of the fireproofing material.

B. Verify hangers, inserts and clips are installed before the application of fireproofing material.

C. Verify ductwork, piping, and other obstructing material and equipment is not installed that will interfere with fireproofing installation.

D. Verify concrete work on steel decking and concrete encased steel is completed.

E. Verify temperature and enclosure conditions are required by fire-proofing material manufacturer.

3.2 APPLICATION

A. Do not start application until written approval has been obtained from manufacturer of fireproofing materials that surfaces have been inspected by the manufacturer or his representative, and are suitable to receive sprayed-on fireproofing.

B. Coordinate application of fireproofing material with other trades.

C. Application of Metal Lath:

1. Apply to beam and columns having painted surfaces which fail ASTM E736 Bond Test requirements in pre-application test area.
2. Apply to beam flanges 300 mm (12-inches) or more in width.
3. Apply to column flanges 400 mm (16-inches) or more in width.
4. Apply to beam or column web 400 mm (16-inches) or more in depth.
5. Tack weld or mechanically fasten on maximum of 300 mm (12-inch) center.
6. See design criteria section of the approved assemblies used.
7. Lap and tie lath member in accordance with ASTM C841.

D. Mix and apply in accordance with manufacturer's instructions.

1. Mechanically control material and water ratios.
2. Apply adhesive and sealer, when not an integral part of the materials, in accordance with the manufacturer's instructions.
3. Apply to density and thickness indicated in UL Fire Resistance Directory, FM Approval Guide, or WH Certification Listings unless specified otherwise. Test in accordance with ASTM E119.

4. Minimum applied dry density per cubic meter (cubic foot) for the underside of the walk on deck (interstitial) hung purl in or beam and steel deck, columns in interstitial spaces and mechanical equipment rooms shall be as follows:
   a. Type I - 240 kg/m^3 (15 lb/ft^3).
   b. Type II - 350 kg/m^3 (22 lb/ft^3).

E. Application shall be completed in one area, inspected and approved by Resident Engineer before removal of application equipment and proceeding with further work.

3.3 FIELD TESTS

A. Tests of applied material will be performed by VA retained Testing Laboratory. See Section 01 45 29, TESTING LABORATORY SERVICES.

B. Resident Engineer will select area to be tested in specific bays on each floor using a geometric grid pattern.

C. Test for thickness and density in accordance with ASTM E605. Areas showing thickness less than that required as a result of fire endurance test will be rejected.

D. Areas showing less than required fireproofing characteristics will be rejected on the following field tests.
   1. Test for cohesion/adhesion: ASTM E736.
   2. Test for bond impact strength: ASTM E760.

3.4 PATCHING AND REPAIRING

A. Inspect after mechanical, electrical and other trades have completed work in contact with fireproofing material, but before sprayed material is covered by subsequent construction.

B. Perform corrective measures in accordance with fireproofing material Manufacturer's recommendations.
   1. Respray areas requiring additional fireproofing material to provide the required thickness, and replace dislodged or removed material.
   2. Spray material for patching by machine directly on point to be patched, or into a container and then hand apply.
   3. Hand mixing of material is not permitted.

C. Repair:
   1. Respray all test and rejected areas.
   2. Patch fireproofing material which is removed or disturbed after approval.

D. Perform final inspection of sprayed areas after patching and repair.

3.5 SCHEDULE

A. Apply fireproofing material in interior structural steel members and on underside of interior steel floor and roof decks, except on following surfaces:
   1. Steel to be enclosed in rated, listed gypsum board assemblies.
   2. Secondary structural steel at equipment supports.
   3. Tube structures embedded in exterior wall and parapet assemblies.

B. Type I:
   1. One hour fire rating.
   2. Two hour fire rating.
   3. Three hour fire rating.

C. Type II:
   1. One hour fire rating.
   2. Two hour fire rating.

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SECTION 07 84 00
FIRESTOPPING PENETRATIONS, JOINTS AND PERIMETER FIRE CONTAINMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. BIDDING REQUIREMENTS, CONTRACTING REQUIREMENTS, and applicable parts of DIVISION 1 - GENERAL REQUIREMENTS.

1.2 DESCRIPTION SUMMARY

A. Provide firestop systems consisting of a material, or combination of materials installed to retain the integrity of fire-rated construction by maintaining an effective barrier against the spread of flame, smoke, and/or hot gases through penetrations, blank openings, construction joints, or at perimeter fire containment in or adjacent to fire-rated barriers in accordance with the requirements of the Building Code for this project.

B. Firestop systems shall be used in locations including, but not limited to, the following:

1. Penetrations through fire-resistance-rated floor and roof assemblies requiring protected openings including both empty openings and openings that contain ducts, pipes, wires, conduits, etc.
2. Penetrations through fire-resistance-rated wall assemblies including both empty openings and openings that contain ducts, pipes, wires, conduits, etc.
3. Membrane penetrations in fire-resistance-rated wall assemblies where items penetrate one side of the barrier.
4. Joints in fire-resistance-rated assemblies to allow independent movement.
5. Perimeter Fire Barrier System between a rated floor/roof and an exterior wall assembly.
6. Joints, through penetrations, and membrane penetrations in Smoke Barriers and Smoke Partitions.

1.3 RELATED WORK

A. Examine Contract Documents for requirements that affect Work of this Section. Other Specification Sections that relate directly to Work of this Section include, but are not limited to:

1. Division 3 – CAST-IN-PLACE CONCRETE; Concrete work
2. Division 4 – UNIT MASONRY
3. Division 5 – EXPANSION, CONTROL, and SEISMIC JOINTS
4. Division 7 – THERMAL AND MOISTURE PROTECTION
5. Division 9 – GYPSUM WALLBOARD
6. Division 15 – MECHANICAL

7. Division 16 – ELECTRICAL, LIGHTING, POWER, ALARMS, and COMMUNICATIONS

1.4 REFERENCES

A. Comply with applicable requirements of the following standards. Where these standards conflict with other specified requirements, the most restrictive requirement shall govern.

1. American Society for Testing and Materials (ASTM).
   a. E 84 Test Method for Surface Burning Characteristics of Building Materials
   d. E 814 Fire Tests of Through-Penetration Fire Stops
2. National Fire Protection Association (NFPA):
   a. NFPA 70 – National Electric Code
   b. NFPA 101 – Life Safety Code
   c. NFPA 221 – Fire Walls and Fire Barriers (preliminary to be released)
   d. NFPA 251 – Fire Tests of Building Construction and Materials
3. Underwriters Laboratories, Inc. (UL):
   a. UL Qualified Firestop Contractor Program
   b. UL 263 Fire Tests of Building Construction and Materials
   c. UL 723 Surface Burning Characteristics of Building Materials
   d. UL 1479 Fire-Tests of Through-Penetration Fire Stops
   e. UL 2079 Tests for Fire Resistance of Building Joint Systems

1.5 SYSTEM PERFORMANCE REQUIREMENTS

A. Penetrations: Provide and install firestopping systems that are produced to resist the spread of fire, and the passage of smoke and other gases according to requirements indicated, including but not limited to the following:

1. Firestop all penetrations passing through fire resistance rated wall and floor assemblies and other locations as indicated on the drawings.
2. Provide and install complete penetration firestopping systems that have been tested and approved by third party testing agency.
3. F – Rated Through-Penetration Firestop Systems: Provide through-penetration firestop systems with F ratings indicated, as determined per ASTM E 814, but not less than one hour or the fire-resistance rating of the construction being penetrated.
4. T – Rated Through-Penetration Firestop Systems: Provide firestop systems with T ratings, in addition to F ratings, as determined per ASTM E 814, where indicated by Code.

B. Perimeter Fire Containment Systems: Provide interior perimeter joint systems with fire-resistance ratings indicated, as determined per ASTM E

2307, but not less than the fire-resistance rating of the floor construction.

C. Fire-Resistive Joints: Provide joint systems with fire-resistance ratings indicated, as determined per UL 2079, but not less than the fire-resistance rating of the construction in which the joint occurs.

D. For firestopping exposed to view, traffic, moisture, or physical damage, provide appropriate firestop systems for these conditions.

1.6 SUBMITTALS

A. Submit in accordance with Section 01 33 23, shop drawings, product data, and samples.

B. Submit Manufacturers Product Data Sheets for each type of product selected. Certify that Firestop Material shall be asbestos free and complies with local regulations.

1. Certification by firestopping manufacturer, that products supplied comply with local regulations controlling use of volatile organic compounds (VOC's) and are nontoxic to building occupants.

C. Submit system design listings, including illustrations from a qualified testing and inspection agency that is applicable to each firestop configuration.

1.7 QUALITY ASSURANCE

A. Fire-Test-Response Characteristics: Provide firestopping System Design Listing by a testing and inspection agency in accordance with the appropriate ASTM Standard(s) per article 1.04. A qualified testing and inspection agency may be UL, FM Research, Intertek Testing Services, Omega Point Laboratories (OPL) ,or another agency performing testing and follow-up inspection services for firestop materials that is acceptable to the authority having jurisdiction.

B. Manufacturer Source Requirements: Obtain firestop systems for each kind of penetration and construction condition indicated from a single primary firestop systems manufacturer unless otherwise permitted by the organization.

1. The organization reserves the right to approve and limit the manufactures and types of manufacturer's products. Materials of different manufacture than allowed by the tested and listed system shall not be intermixed in the same firestop system or opening.
2. Tested and listed firestop systems are to be used before an Engineering Judgment (EJ) or Equivalent Fire Resistance Rated Assembly (EFRRA) is installed.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver firestopping products to project site in original, unopened containers or packages with intact and legible manufacturers' labels identifying product and manufacturer.
B. Ensure that manufacturers products are not diluted mixed or otherwise altered unless permitted by the manufactures directions.
C. Store and handle firestopping materials in accordance with manufacturers written instructions. Product and equipment staging and storage must be approved by the COTR.

1.9 PROJECT CONDITIONS

A. Environmental Conditions: Install firestopping in accordance with manufacturers written instructions.
B. Ventilation: Ventilate per firestopping manufacturers' instructions or Material Safety Data Sheet (MSDS)

1.10 SEQUENCING AND SCHEDULING

A. Project coordination is essential to inform and educate all the parties involved with the firestopping process of their role and how they can affect firestopping on the project. A pre-construction meeting shall be scheduled and required for all parties involved prior to the start of construction.
B. Do not cover up firestopping installations until Owner's inspection agency or the Authorities Having Jurisdiction have examined each installation.
C. When work takes place within existing building that are not separated by a 2-hour barrier from occupied areas, and where it is not feasible to have a qualified firestop contractor providing fire sealing on a daily basis, it shall be the responsibility of the trade penetrating the fire rated barrier to provide temporary fire protection of all penetrations at the end of each work day. Temporary protection must meet all NFPA codes related to fire barrier penetrations. The temporary protection must be maintained in proper order until the permanent fire stopping material is installed.

1.11 ENVIRONMENTAL REGULATIONS

A. All materials shall be asbestos free and comply with local VOC Regulations.
B. If required, hazardous disposal of firestop materials shall be strictly observed as noted on the individual MSDS.
C. Bulk storage shall be preapproved and in locations as to not present a hazard to the environment or risk to occupants.

PART 2 – PRODUCTS

2.1 FIRESTOPPING, GENERAL

A. Systems listed by approved testing agencies, as identified in part 1 above, may be used, providing they conform to the construction type, penetrant type, annular space requirements and fire rating involved in each separate instance.

B. Allowable firestop products produced by FCIA Manufacturer Members in good standing.
   1. 3M Fire Protection Products
   2. HILTI, Inc.
   3. Specified Technologies, Inc.
   4. Thermafiber, LLC

C. Firestopping at penetrations to be sleeved type assemblies.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with installer present, for compliance with requirements for opening configurations, penetrating items, substrates, and other conditions affecting performance of firestopping. Notify the responsible party or parties of any unsatisfactory conditions. Do not proceed with installation until unsatisfactory conditions have been corrected.

B. Identifying any unique conditions that may create unusual construction dust, noise, or other impacts to infection control or life safety that may be outside of established and approved methods of the organization.

3.2 PREPARATION

A. Priming: Prime substrates where recommended by firestopping manufacturer using that manufacturer’s recommended products and methods. Confine primers to areas of bond. Do not allow spillage and migration onto exposed surfaces.

B. Masking Tape: Use masking tape to prevent firestopping from contacting adjoining surfaces that will remain exposed upon completion of work. Remove tape as soon as it is possible to do so without disturbing the firestopping seal with substrates.

C. Verify that system components are clean, dry, and ready for installation.

D. Verify that field dimensions are as shown on the drawings and as recommended by the manufacturer.

3.3 INSTALLING PENETRATION FIRESTOPS

A. General: Comply with the “System Performance Requirements” article in Part 1 and the through-penetration firestop manufacturer’s installation instructions and drawings pertaining to products and applications indicated.

1. Coordinate with other trades to assure that all pipes, conduit, cable, and other items, which penetrate fire rated construction, have been permanently installed prior to installation of firestop assemblies.
2. Schedule the work to assure that partitions and all other construction that conceals penetrations are not erected prior to the installation of firestop and smoke seals.

B. Install forming/damming materials and other accessories in accordance with manufacturers written instructions.

C. Install fill materials for through-penetration firestop systems by proven techniques to produce the following results:
1. Completely fill voids and cavities formed by openings, forming materials, accessories, and penetrating items.
2. Install materials so they contact and adhere to substrates formed by openings and penetrating items.
3. For fill materials that will remain exposed after completing Work, finish to produce smooth, uniform surfaces.

D. Install approved fire stopping sealant around items that penetrate between floors. Install sealant around penetrations at both sides of floor level, at floor level of penetration and underside of floor level below.

E. Properly seal all abandoned penetrations through rated walls and floors. In floors, use grout, the full thickness of the slab, to meet fire rating requirements.

3.4 INSTALLING FIRESTOP JOINT SYSTEMS

A. General: Comply with the "System Performance Requirements" article in Part 1 and with the firestop manufacturer's installation instructions and drawings pertaining to products and applications indicated.
1. Install joint fillers to provide support of firestop materials during application and at the position required to produce the cross-sectional shapes and depths of installed firestop material relative to joint widths that allow optimum sealant movement capability and develop fire-resistance rating required.

B. Install systems by proven techniques that result in a sound firestop system:
1. Directly contacting and fully wetting joint substrates.
2. Completely filling recesses provided for each joint configuration,
3. Providing uniform, cross-sectional shapes and depths relative to joint width that optimize movement capability.

C. Tool non-sag firestop materials immediately after their application and prior to the time skinning begins. Form smooth, uniform beads of configuration indicated or required to:
   1. Produce fire-resistance rating
   2. To eliminate air pockets
   3. To ensure contact and adhesion with sides of joint.

3.5 INSTALLING PERIMETER FIRE BARRIER SYSTEMS

A. General: Comply with "System Performance Requirements" article in Part 1 and with the firestop manufacture's installation and drawings pertaining to products and applications indicated.
B. Install metal framing, curtain wall insulation, mechanical attachments, and firestop materials as applicable within the system design.

3.6 FIELD QUALITY CONTROL

A. Inspection – The VA organization may require an independent inspection agency employed and paid by the VA to examine penetration firestopping in accordance with ASTM E – 2174, "Standard Practice for On-Site Inspection of Installed Fire Stops and ASTM E-2393, "Standard Practice for On-Site Inspection of Installed Fire Stop Joint Systems. Inspection agency will examine firestopping and will determine, in general, that firestopping has been installed in compliance with requirements of tested and listed firestop system, and installation process conforms to FM 4991 – Standard for Approval of Firestop Contractors or UL Qualified Firestop Contractor Program.
B. The inspector shall advise the contractor of any deficiencies noted within one (1) working day.
C. Do not proceed to enclose firestopping with other construction until inspection agency has verified that the firestop installation complies with the requirements.
D. Where deficiencies are found, repair or replace the firestopping so that it complies with requirements of tested and listed system design.

3.7 CLEAN-UP AND SPECIAL WORKING CONDITIONS

A. Firestop Material: Clean off excess fill materials and sealants adjacent to openings and joints as work progresses. Use methods and cleaning materials approved by manufacturers of firestopping products and or assemblies in which openings and joints occur.
B. Protect firestopping during and after curing period from contact with contaminating substances. If damage caused by others, owner and general contractor to instruct firestop contractor to make appropriate repairs and charge to appropriate trades.
C. Debris: Removal of litter and debris shall be in closed or covered containers at the end of each shift or more often as necessary to

prevent unsafe fire conditions and reduce construction dusts. The organization may require additional measures in areas where compromised patients are housed or treated.

1. Areas may include special procedure areas, operating rooms, special ventilation rooms, and other spaces deemed critical.
2. Such areas may require specialized local barriers to be erected prior to commencing work. Special consideration to scheduling and potentially working in off tour hours may be necessary.

D. Surfaces: Ceiling grids shall be replaced at the end of each shift unless prior approval by the Contracting Officer Technical Representative. Floors and other surfaces that may become contaminated by construction dust and debris as a result of the work shall be cleaned following completion of each repair location in a manner acceptable to the organization.

E. Mitigation Measures: Where work may temporary eliminate or restrict life safety features as determined by the organization. Special Interim Life Safety Measures (ILSMs) may be required as mitigating measures.

3.8 Warranty

A. Firestopping work subject to the terms of the Article "Warranty of Construction", FAR clause 52.246-21, except extend the warranty period to five years.

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SECTION 07 92 00
JOINT SEALANTS

PART 1 - GENERAL

1.1 DESCRIPTION:

Section covers all sealant and caulking materials and their application, wherever required for complete installation of building materials or systems.

1.2 RELATED WORK:

A. Sealing of site work concrete paving: Section 32 05 23, CEMENT AND CONCRETE FOR EXTERIOR IMPROVEMENTS.

B. Masonry control and expansion joint: Section 04 20 00, UNIT MASONRY.

C. Firestopping penetrations: Section 07 84 00, FIRESTOPPING PENETRATIONS, JOINTS AND PERIMETER FIRE CONTAINMENT.

D. Glazing: Section 08 80 00, GLAZING.

E. Sound rated gypsum partitions/sound sealants: Section 09 29 00, GYPSUM BOARD.

F. Mechanical Work: Section 21 05 11, COMMON WORK RESULTS FOR FIRE SUPPRESSION. Section 22 05 11, COMMON WORK RESULTS FOR PLUMBING. Section 23 05 11, COMMON WORK RESULTS FOR HVAC AND STEAM GENERATION.

1.3 QUALITY CONTROL:

A. Installer Qualifications: An experienced installer who has specialized in installing joint sealants similar in material, design, and extent to those indicated for this Project and whose work has resulted in joint-sealant installations with a record of successful in-service performance.

B. Source Limitations: Obtain each type of joint sealant through one source from a single manufacturer.

1.4 SUBMITTALS:

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Manufacturer's installation instructions for each product used.

C. Cured samples of exposed sealants for each color where required to match adjacent material.

D. Manufacturer's Literature and Data:

1. Caulking compound
2. Primers
3. Sealing compound, each type, including compatibility when different sealants are in contact with each other.

1.5 PROJECT CONDITIONS:

A. Environmental Limitations:

1. Do not proceed with installation of joint sealants under following conditions:

a. When ambient and substrate temperature conditions are outside limits permitted by joint sealant manufacturer or are below 4.4 °C (40 °F).

b. When joint substrates are wet.

B. Joint-Width Conditions:

1. Do not proceed with installation of joint sealants where joint widths are less than those allowed by joint sealant manufacturer for applications indicated.

C. Joint-Substrate Conditions:

1. Do not proceed with installation of joint sealants until contaminants capable of interfering with adhesion are removed from joint substrates.

1.6 DELIVERY, HANDLING, AND STORAGE:

A. Deliver materials in manufacturers' original unopened containers, with brand names, date of manufacture, shelf life, and material designation clearly marked thereon.

B. Carefully handle and store to prevent inclusion of foreign materials.

C. Do not subject to sustained temperatures exceeding 5° C (40° F) or less than 32° C (90° F).

1.7 DEFINITIONS:

A. Definitions of terms in accordance with ASTM C717 and as specified.

B. Back-up Rod: A type of sealant backing.

C. Bond Breakers: A type of sealant backing.

D. Filler: A sealant backing used behind a back-up rod.

1.8 WARRANTY:

A. Warranty exterior sealing against leaks, adhesion, and cohesive failure, and subject to terms of "Warranty of Construction", FAR clause 52.246-21, except that warranty period shall be extended to two years.

B. General Warranty: Special warranty specified in this Article shall not deprive Government of other rights Government may have under other provisions of Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of Contract Documents.

1.9 APPLICABLE PUBLICATIONS:

A. Publications listed below form a part of this specification to extent referenced. Publications are referenced in text by basic designation only.

B. American Society for Testing and Materials (ASTM):

C509-06.....Elastomeric Cellular Preformed Gasket and Sealing Material.

C612-04.....Mineral Fiber Block and Board Thermal Insulation.

C717-07.....Standard Terminology of Building Seals and Sealants.

C834-05.....Latex Sealants.

C919-02.....Use of Sealants in Acoustical Applications.

C920-05.....Elastomeric Joint Sealants.

C1021-08.....Laboratories Engaged in Testing of Building Sealants.

C1193-05.....Standard Guide for Use of Joint Sealants.

C1330-02 (R2007).....Cylindrical Sealant Backing for Use with Cold Liquid Applied Sealants.

D1056-07.....Specification for Flexible Cellular Materials—Sponge or Expanded Rubber.

E84-08.....Surface Burning Characteristics of Building Materials.

C. Sealant, Waterproofing and Restoration Institute (SWRI).
The Professionals' Guide

PART 2 - PRODUCTS

2.1 SEALANTS:

A. S-1:

1. ASTM C920, polyurethane or polysulfide.
2. Type M.
3. Class 25.
4. Grade NS.
5. Shore A hardness of 20-40

B. S-2:

1. ASTM C920, polyurethane or polysulfide.
2. Type M.
3. Class 25.
4. Grade P.
5. Shore A hardness of 25-40.

C. S-3:

1. ASTM C920, polyurethane or polysulfide.
2. Type S.
3. Class 25, joint movement range of plus or minus 50 percent.
4. Grade NS.
5. Shore A hardness of 15-25.
6. Minimum elongation of 700 percent.

D. S-4:

1. ASTM C920 polyurethane or polysulfide.
2. Type S.
3. Class 25.
4. Grade NS.
5. Shore A hardness of 25-40.

E. S-5:

1. ASTM C920, silicone, neutral cure.
2. Type S.
3. Class: Joint movement range of plus 100 percent to minus 50 percent.
4. Grade NS.
5. Shore A hardness of 15-20.
6. Minimum elongation of 1200 percent.

F. S-6:

1. ASTM C920, silicone, neutral cure.
2. Type S.
3. Class 25.
4. Grade NS.
5. Shore A hardness of 25-30.
6. Structural glazing application.

G. S-7:

1. ASTM C920, silicone, acetoxy cure.
2. Type S.
3. Class 25.
4. Grade NS.

5. Shore A hardness of 25-30.
6. Structural glazing application.

H. S-8:
1. ASTM C920 silicone.
2. Type S.
3. Class 25.
4. Grade NS.
5. Shore A hardness of 25-30.
6. Non-yellowing, mildew resistant.

I. S-10:
1. ASTMC C920, coal tar extended fuel resistance polyurethane.
2. Type M/S.
3. Class 25.
4. Grade P/NS.
5. Shore A hardness of 15-20.

J. S-9:
1. ASTM C920 polyurethane.
2. Type M/S.
3. Class 25.
4. Grade P/NS.
5. Shore A hardness of 35 to 50.

K. S-10:
1. ASTM C920, polyurethane.
2. Type M/S.
3. Class 25, joint movement range of plus or minus 50 percent.
4. Grade P/NS.
5. Shore A hardness of 25 to 50.

2.2 CAULKING COMPOUND:

A. C-1: ASTM C834, acrylic latex.

B. C-2: One component acoustical caulking, non drying, non hardening, synthetic rubber.

2.3 COLOR:

A. Sealants used with exposed masonry shall match color of mortar joints.

B. Sealants used with unpainted concrete shall match color of adjacent concrete.

C. Color of sealants for other locations shall be light gray or aluminum, unless specified otherwise.

D. Caulking shall be light gray or white, unless specified otherwise.

2.4 JOINT SEALANT BACKING:

A. General: Provide sealant backings of material and type that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.

B. Cylindrical Sealant Backings: ASTM C1330, of type indicated below and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance:

1. Type C: Closed-cell material with a surface skin.

C. Elastomeric Tubing Sealant Backings: Neoprene, butyl, EPDM, or silicone tubing complying with ASTM D1056, nonabsorbent to water and gas, and capable of remaining resilient at temperatures down to minus 32° C (minus 26° F). Provide products with low compression set and of size and shape to provide a secondary seal, to control sealant depth, and otherwise contribute to optimum sealant performance.

D. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint where such adhesion would result in sealant failure. Provide self-adhesive tape where applicable.

2.5 FILLER:

A. Mineral fiber board: ASTM C612, Class 1.

B. Thickness same as joint width.

C. Depth to fill void completely behind back-up rod.

2.6 PRIMER:

A. As recommended by manufacturer of caulking or sealant material.

B. Stain free type.

2.7 CLEANERS-NON POUROUS SURFACES:

Chemical cleaners acceptable to manufacturer of sealants and sealant backing material, free of oily residues and other substances capable of staining or harming joint substrates and adjacent non-porous surfaces and formulated to promote adhesion of sealant and substrates.

PART 3 - EXECUTION

3.1 INSPECTION:

A. Inspect substrate surface for bond breaker contamination and unsound materials at adherent faces of sealant.

B. Coordinate for repair and resolution of unsound substrate materials.

C. Inspect for uniform joint widths and that dimensions are within tolerance established by sealant manufacturer.

3.2 PREPARATIONS:

A. Prepare joints in accordance with manufacturer's instructions and SWRI.

B. Clean surfaces of joint to receive caulking or sealants leaving joint dry to the touch, free from frost, moisture, grease, oil, wax, lacquer paint, or other foreign matter that would tend to destroy or impair adhesion.

1. Clean porous joint substrate surfaces by brushing, grinding, blast cleaning, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants.
2. Remove loose particles remaining from above cleaning operations by vacuuming or blowing out joints with oil-free compressed air. Porous joint surfaces include the following:
   a. Concrete.
   b. Masonry.
   c. Unglazed surfaces of ceramic tile.
3. Remove laitance and form-release agents from concrete.
4. Clean nonporous surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants.
   a. Metal.
   b. Glass.
   c. Porcelain enamel.
   d. Glazed surfaces of ceramic tile.

C. Do not cut or damage joint edges.

D. Apply masking tape to face of surfaces adjacent to joints before applying primers, caulking, or sealing compounds.

1. Do not leave gaps between ends of sealant backings.
2. Do not stretch, twist, puncture, or tear sealant backings.
3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.

E. Apply primer to sides of joints wherever required by compound manufacturer's printed instructions.

1. Apply primer prior to installation of back-up rod or bond breaker tape.

2. Use brush or other approved means that will reach all parts of joints.

F. Take all necessary steps to prevent three sided adhesion of sealants.

3.3 BACKING INSTALLATION:

A. Install back-up material, to form joints enclosed on three sides as required for specified depth of sealant.

B. Where deep joints occur, install filler to fill space behind the back-up rod and position the rod at proper depth.

C. Cut fillers installed by others to proper depth for installation of back-up rod and sealants.

D. Install back-up rod, without puncturing the material, to a uniform depth, within plus or minus 3 mm (1/8 inch) for sealant depths specified.

E. Where space for back-up rod does not exist, install bond breaker tape strip at bottom (or back) of joint so sealant bonds only to two opposing surfaces.

F. Take all necessary steps to prevent three sided adhesion of sealants.

3.4 SEALANT DEPTHS AND GEOMETRY:

A. At widths up to 6 mm (1/4 inch), sealant depth equal to width.

B. At widths over 6 mm (1/4 inch), sealant depth 1/2 of width up to 13 mm (1/2 inch) maximum depth at center of joint with sealant thickness at center of joint approximately 1/2 of depth at adhesion surface.

3.5 INSTALLATION:

A. General:

1. Apply sealants and caulking only when ambient temperature is between 5° C and 38° C (40° and 100° F).
2. Do not use polysulfide base sealants where sealant may be exposed to fumes from bituminous materials, or where water vapor in continuous contact with cementitious materials may be present.
3. Do not use sealant type listed by manufacture as not suitable for use in locations specified.
4. Apply caulking and sealing compound in accordance with manufacturer's printed instructions.
5. Avoid dropping or smearing compound on adjacent surfaces.
6. Fill joints solidly with compound and finish compound smooth.
7. Tool joints to concave surface unless shown or specified otherwise.
8. Finish paving or floor joints flush unless joint is otherwise detailed.

9. Apply compounds with nozzle size to fit joint width.
10. Test sealants for compatibility with each other and substrate. Use only compatible sealant.

B. For application of sealants, follow requirements of ASTM C1193 unless specified otherwise.

C. Where gypsum board partitions are of sound rated, fire rated, or smoke barrier construction, follow requirements of ASTM C919 only to seal all cut-outs and intersections with the adjoining construction unless specified otherwise.

1. Apply a 6 mm (1/4 inch) minimum bead of sealant each side of runners (tracks), including those used at partition intersections with dissimilar wall construction.
2. Coordinate with application of gypsum board to install sealant immediately prior to application of gypsum board.
3. Partition intersections: Seal edges of face layer of gypsum board abutting intersecting partitions, before taping and finishing or application of veneer plaster-joint reinforcing.
4. Openings: Apply a 6 mm (1/4 inch) bead of sealant around all cut-outs to seal openings of electrical boxes, ducts, pipes and similar penetrations. To seal electrical boxes, seal sides and backs.
5. Control Joints: Before control joints are installed, apply sealant in back of control joint to reduce flanking path for sound through control joint.

3.6 FIELD QUALITY CONTROL:

A. Visually inspect joints for complete fill, for absence of voids, and for joint configuration complying with specified requirements.

3.7 CLEANING:

A. Fresh compound accidentally smeared on adjoining surfaces: Scrape off immediately and rub clean with a solvent as recommended by the caulking or sealant manufacturer.

B. After filling and finishing joints, remove masking tape.

C. Leave adjacent surfaces in a clean and unstained condition.

3.8 LOCATIONS:

A. Exterior Building Joints, Horizontal and Vertical:

1. Metal to Metal: Type S-1, S-2
2. Metal to Masonry or Cast Stone: Type S-1
3. Masonry to Masonry or Cast Stone: Type S-1
4. Cast Stone to Cast Stone: Type S-1

5. Threshold Setting Bed: Type S-1, S-3, S-4
6. Masonry Expansion and Control Joints: Type S-5

B. Metal Flashings:
1. Flashings to Wall: Type S-5
2. Metal to Metal: Type S-5

C. Sanitary Joints:
1. Walls to Plumbing Fixtures: Type S-8
2. Counter Tops to Walls: Type S-8
3. Pipe Penetrations: Type S-8

D. Horizontal Traffic Joints:
1. Concrete Paving: Type S-9 or S-10

E. High Temperature Joints over 204 degrees C (400 degrees F):
1. Exhaust Pipes, Flues, Breech Stacks: Type S-6 or S-7

F. Interior Caulking:
1. Typical Narrow Joint 6 mm, (1/4 inch) or less at Walls and Adjacent Components: Types C-1, C-2.
2. Perimeter of Doors, Windows, Access Panels which Adjoin Masonry Surfaces: Types C-1, C-2.
3. Joints at Masonry Walls and Columns, Piers, Concrete Walls or Exterior Walls: Types C-1, C-2.
4. Exposed Isolation Joints at Top of Full Height Walls: Types C-1, C-2.
5. Exposed Acoustical Joint at Sound Rated Partitions Type C-2.
6. Concealed Acoustic Sealant Type S-4, C-1, C-2.

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SECTION 07 95 13
EXPANSION JOINT COVER ASSEMBLIES

PART 1 - GENERAL

1.1 DESCRIPTION

A. Section specifies floor, wall and ceiling, roof, roof and wall, seismic and building expansion joint assemblies.

B. Types of assemblies:

Metal Plate Cover

Roof Expansion Joint Covers

Elastomeric Joint Covers

Preformed Elastomeric Sealant Joint

1.2 RELATED WORK

A. Sheet Metal Expansion Joint Seals: Section 07 60 00 FLASHING AND SHEET METAL.

1.3 QUALITY ASSURANCE

A. Project Conditions:

1. Check actual locations of walls and other construction, to which work must fit, by accurate field measurements before fabrication.
2. Show recorded measurements on final shop drawings.

B. Fire tests performed by Factory Mutual, Underwriters Laboratories, Inc., Warnock Hersey or other approved independent testing laboratory.

1.4 DELIVERY STORAGE AND HANDLING

A. Take care in handling of materials so as not to injure finished surface and components.

B. Store materials under cover in a dry and clean location off the ground.

C. Remove materials which are damaged or otherwise not suitable for installation from job site and replace with acceptable materials.

1.5 SUBMITTALS

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Manufacturer's Literature and Data:

1. Submit copies of manufacturer's current literature and data for each item specified.
2. Clearly indicate movement capability of cover assemblies and suitability of material used in exterior seals for ultraviolet exposure.

C. Shop Drawings:

1. Showing full extent of expansion joint cover assemblies; include large-scale details indicating profiles of each type of expansion joint cover assembly, splice joints between sections, joiners with other type assemblies, special end conditions, anchorages, fasteners, and relationship to adjoining work and finishes.
2. Include description of materials and finishes and installation instructions.

D. Samples:

1. Samples of each type and color of metal finish on metal of same thickness and alloy used in work.
2. Samples of each type and color of flexible seal used in work.

1.6 APPLICABLE PUBLICATIONS

A. Publications listed form part of this specification to extent referenced. Publications are referred to in text by basic designation only.

B. American Society for Testing and Materials (ASTM):

A36/A36M-05.....Structural Steel
A283/A283M-03.....Low and Intermediate Tensile Strength Carbon Steel Plates
A786/A786M-05.....Rolled Steel Floor Plates
B209M-06.....Aluminum and Aluminum-Alloy Sheet and Plate (Metric)
B221M-06.....Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes (Metric)
C864-05.....Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers
C920-05.....Elastomeric Joint Sealants
D1187-97 (R2002).....Asphalt Base Emulsions for Use as Protective Coatings for Metal
E119-07.....Fire Tests of Building Construction and Materials
E814-06.....Fire Tests of Through-Penetration Fire Stops

C. Federal Specifications (Fed. Spec):

TT-P-645B.....Primer, Paint, Zinc-Molybdate, Alkyd Type

D. The National Association of Architectural Metal Manufacturers (NAAMM):

AMP 500 Series.....Metal Finishes Manual.

E. National Fire Protection Association (NFPA):

251-05.....Tests of Fire Endurance of Building Construction and Materials

F. Underwriters Laboratories Inc. (UL):

263-03.....Fire Tests of Building Construction and Materials

PART 2 - PRODUCTS

2.1 MATERIALS

A. Structural Steel Shapes: ASTM A36.

B. Steel Plate: ASTM A283, Grade C.

C. Rolled Steel Floor Plate: ASTM A786.

D. Aluminum:

1. Extruded: ASTM B221, alloy 6063-T5.
2. Plate and Sheet: ASTM B209, alloy 6061-T6.

E. Elastomeric Sealant:

1. ASTM C920, polyurethane.
2. Type M.
3. Class 25.
4. Grade P or NS.
5. Shore A hardness 20-40, unless specified otherwise.

F. Thermoplastic Rubber:

1. ASTM C864.
2. Dense Neoprene or other material standard with expansion joint manufacturers having the same physical properties.

G. Vinyl Invertor Sealant Waterstops: Manufacturers’ standard shapes and grade.

H. Fire Barrier:

1. Designed for indicated or required dynamic structural movement without material degradation or fatigue.
2. Tested in maximum joint width condition as a component of an expansion joint cover assembly in accordance with UL 263 NFPA 251, or ASTM E119 and E814, including hose steam test at full-rated period.

I. Zinc-Molybdate Primer: Fed. Spec. TT-P-645.

J. Accessories:

1. Manufacturer's standard anchors, fasteners, set screws, spaces, flexible secondary water stops or seals and filler materials, drain tubes, adhesive and other accessories as indicated or required for complete installations.

2. Compatible with materials in contact.
3. Water stops.

2.2 FABRICATION

A. General:

1. Use ceiling and wall expansion joint cover assemblies of same design as floor to wall and floor to floor expansion joint cover assemblies. Unless shown otherwise.
2. Provide expansion joint cover assemblies of design, basic profile, materials and operation indicated required to accommodate joint size variations in adjacent surfaces, and as required for anticipated structural movement.
3. Deliver to job site ready for use and fabricated in as large sections and assemblies as practical. Assemblies identical to submitted and reviewed shop drawings, samples and certificates.
4. Furnish units in longest practicable lengths to minimize number of end joints. Provide mitered corners where joint changes directions or abuts other materials.
5. Include closure materials and transition pieces, tee-joints, corners, curbs, cross-connections and other assemblies.
6. Fire Performance Characteristics:
   a. Provide expansion joint cover assemblies identical to those of assemblies whose fire resistance has been determined per ASTM E119 and E814, NFPA 251, or UL 263 including hose stream test at full-rated period.
   b. Fire rating: Not less than rating of adjacent floor or wall construction.
7. Fire Barrier Systems:
   a. Material to carry label of approved independent testing laboratory, and be subject to follow-up system for quality assurance.
   b. Include thermal insulation where necessary, in accordance with above tests, with factory cut miters and transitions.
   c. For joint widths up to and including 152 mm (six inches), supply barrier in lengths up to 15240 mm (50 feet) to eliminate field splicing.
   e. For joints within enclosed spaces such as chase walls, include 1 mm (0.032-inch) thick galvanized steel cover where conventional expansion joint cover is not used.

8. Seal Strip factory - formed and bonded to metal frames and anchor members.
9. Compression Seals: Prefabricate from thermoplastic rubber or dense neoprene to sizes and approximate profiles shown.

B. Interior Floor-to-Floor Joint Cover Assemblies:
   1. Basis-of-Design: Construction Specialties; PC-400.
      a. Continuous extruded aluminum cover plate designed to finish flush with adjacent floor of profile indicated with seating surface and raised floor rim to accommodate flooring.
      b. Provide concealed bolt and steel anchors for embedment in concrete.
      c. Designed for filler materials between raised rim of frame and edge of cover plate where shown.
      d. Frame and cover plates of same metal where exposed.
         1) Design cover plates to support 180 Kg (400 lbs) per 0.3 square meters (1-square foot).
         2) Cover plates free of rattle due to traffic.
         3) No gaps or budges occur on filler material during design movement of joint.
         4) Provide manufacturer's continuous standard flexible vinyl water stop under floor joint cover assemblies.

C. Interior Wall-to-Wall Joint Cover Assemblies (Straight):
   1. Basis-of-Design: Construction Specialties; AFW Series 200/400/600.
      a. Continuous extruded aluminum center plate with concealed frame and cover plate for fastening to wall.
      b. Provide concealed attachment of cover to frame cover in close contact with adjacent finish wall surfaces.
      c. Use smooth surface cover plates matching floor plates.
      d. Use expansion fire inserts in fire rated walls, rated same as hour rating of wall.

D. Interior Wall-to-Wall Joint Cover Assemblies (Corner):
   1. Basis-of-Design: Construction Specialties; AFWC Series 200/400/600.
      a. Continuous extruded aluminum center plate with concealed frame and cover plate for fastening to wall.
      b. Provide concealed attachment of cover to frame cover in close contact with adjacent finish wall surfaces.
      c. Use smooth surface cover plates matching floor plates.

d. Use expansion fire inserts in fire rated walls, rated same as hour rating of wall.

E. Exterior Wall Joint Assemblies:

1. Basis-of-Design: Construction Specialties; ESC Series 400/600.
   a. Continuous extruded aluminum cover plate with polyethylene vapor barrier.
   b. Extend cover to lap each side of joint and to permit free movement on one side.
   c. Provide concealed attachment of cover to frame for cover with cover in close contact with adjacent finish surfaces.
   d. Use angle cover plate of intersection of walls.
   e. Variable movement extruded rubber primary seal designed to remain in aluminum frame, throughout movement of joint.
   f. Provide factory heat welded transitions where directional changes occur to ensure a watertight system.

F. Ceiling-to-Ceiling Assemblies:

1. Basis-of-Design: Construction Specialties; AFW Series 200/600.
   a. Continuous extruded aluminum center plate with concealed anchor clip and cover plate.
   b. Extend cover to lap each side of joint and to permit free movement on one side.
   c. Provide concealed attachment of cover to frame for cover with cover in close contact with adjacent finish surfaces.
   d. Variable movement extruded rubber primary seal designed to remain in aluminum frame, throughout movement of joint.
   e. Provide factory heat welded transitions where directional changes occur to ensure a watertight system.

G. Ceiling-to-Wall Assemblies:

1. Basis-of-Design: Construction Specialties; AFWC 600.
   a. Continuous formed aluminum center plate with concealed anchor clip cover plate.
   b. Extend cover to lap each side of joint and to permit free movement on one side.
   c. Provide concealed attachment of cover to frame for cover with cover in close contact with adjacent finish surfaces.
   d. Variable movement extruded rubber primary seal designed to remain in aluminum frame, throughout movement of joint.

e. Provide factory heat welded transitions where directional changes occur to ensure a watertight system.

H. Extruded Aluminum Roof Expansion Joint Covers

1. Basis-of-Design: Construction Specialties; SJR-600.

a. Roof expansion joint cover system consists of an extruded aluminum cover, extruded frame or curb vertical section, and aluminum compression clamp counter flashing, complete with moisture seals. Form cover and vertical section from extruded aluminum, 2 mm (0.080 inch) minimum thickness with spring steel tension or pivot bar.

b. Fabricate in not less than (12 foot) lengths with fastener openings slotting for expansion at (24 inch) centers.

c. Provide four-way expansion, for joint widths shown.

d. Provide continuous moisture seal.

e. Provide 24” wide polyethylene vapor barrier.

f. Fabricate corners as one piece assembly with mitered and welded joint and least dimension legs not less than 305 mm (12 inches)long.

g. Factory fabricate end caps and transitions to insure waterproof assembly.

2. Basis-of-Design: Construction Specialties; SJRW-600.

a. Roof expansion joint cover system consists of an extruded aluminum cover, extruded frame or curb vertical section, and aluminum compression clamp counter flashing, complete with moisture seals. Form cover and vertical section from extruded aluminum, 2 mm (0.080 inch).

b. Fabricate in not less than (12 foot) lengths with fastener openings slotting for expansion at (24 inch) centers.

c. Provide four-way expansion, for joint widths shown.

d. Provide continuous moisture seal.

e. Provide 24” wide polyethylene vapor barrier.

f. Fabricate corners as one piece assembly with mitered and welded joint and least dimension legs not less than 305 mm (12 inches)long.

g. Factory fabricate end caps and transitions to insure waterproof assembly.

2.3 METAL FINISHES

A. General:

1. Apply finishes in factory after products are fabricated.

2. Protect finishes on exposed surfaces with protective covering before shipment.

B. Aluminum Finishes:

1. Finishes as specified in Section 09 06 00 SCEHDULE OF FINISHES.

PART 3 EXECUTION

3.1 EXAMINATION

A. Manufacturer’s representative shall make a thorough examination of surfaces receiving work of this section.

B. Before starting installation, notify prime contractor of defects which would affect satisfactory completion of work.

3.2 PREPARATION

A. Verify measurements and dimensions at job site and cooperate in coordination and scheduling of work with work of related trades.

B. Give particular attention to installation of items embedded in concrete and masonry so as not to delay job progress.

C. Provide templates to related trade for location of support and anchorage items.

3.3 INSTALLATION

A. Install in accordance with manufacturers installation instructions unless specified otherwise.

B. Provide anchorage devices and fasteners for securing expansion joint assemblies to in-place construction including threaded fasteners with drilled-in fasteners for masonry and concrete where anchoring members are not embedded in concrete. Provide metal fasteners of type and size to suit type of construction indicated and provide for secure attachment of expansion joint cover assemblies.

C. Perform cutting, drilling and fitting required for installation of expansion joint cover assemblies.

D. Install joint cover assemblies in true alignment and proper relationship to expansion joint opening and adjoining finished surfaces measured from established lines and levels.

E. Allow for thermal expansion and contraction of metal to avoid buckling.

F. Set floor covers at elevations flush with adjacent finished floor materials unless shown otherwise.

G. Material and method of grouting floor frames set in prepared recesses in accordance with manufacturer’s instructions.

H. Locate wall, ceiling and soffit covers in continuous contact with adjacent surfaces. Securely attach in place with required accessories.

I. Locate anchors at interval recommended by manufacturer, but not less than 75 mm (3-inches) from each ends, and, not more than 610 mm (24-inches) on centers.

J. Maintain continuity of expansion joint cover assemblies with end joints held to a minimum and metal members aligned mechanically using splice joints.

K. Cut and fit ends to produce joints that will accommodate thermal expansion and contraction of metal to avoid buckling of frames or plates.

L. Flush Metal Cover Plates:
   1. Secure flexible filler between frames so that it will compress and expand.
   2. Adhere flexible filler materials to frames with adhesive or pressure-sensitive tape as recommended by manufacturer.

M. Waterstops:
   1. Install in conjunction with floor joints and where shown, run continuously to prevent water damage to finish spaces.
   2. Provide seal with frame to prevent water leakage.
   3. Provide outlet tubes from waterstops to drain to prevent damage to finish spaces.

N. Fire Barriers:
   1. Install in compliance with tested assembly.
   2. Install in floors and in fire rated walls.
   3. Use fire barrier sealant or caulk supplied with system.

O. Sealants:
   Install to prevent water and air infiltration.

P. Vertical Exterior Extruded Thermoplastic Rubber.
   1. Install side frames mounted on sealant or butyl caulk tape with appropriate anchors 610 mm (24 inches) on center complete with independent continuous PVC back seal.
   2. Install primary seals retained in extruded aluminum side frames.

Q. Installation of Extruded Thermoplastic Rubber or Seals:
   1. For straight sections, provide preformed seals in continuous lengths.
   2. Vulcanize or heat-seal field splice joints to provide watertight joints using manufacturer's recommended procedures.

R. Installation of Preformed Elastomeric Sealant Joint:
   1. Locate joint directly over joints in wall or floor substrates.

2. Full length shall be fastened to substrate using a construction adhesive.
3. Install flush or slightly below finish material.

3.4 PROTECTION

A. Take proper precautions to protect the expansion joint covers from damage after they are in place.

B. Cover floor joints with plywood where wheel traffic occurs.

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